THE GAS JOURNAL

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Vol. 197 84th Year No. 3588

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Public Lighting Assistant Required.

The Nottingham City Council require a Public Lighting Assistant. The salary offered is £300 per annum. [p. 499.]

Exhibits at the B.I.F.

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Gas in Industry.

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Dry Gas Meter—Suggestions on Policy.

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Low-Temperature Carbonization.

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Distribution of Gas.

We commence publication of an historic record, by Mr. H. J. Escreet, of distribution at high and medium pressures in the area of the Gas Light and Coke Company. [p. 484.]

Belt Conveyors.

In a paper before the Midland Junior Gas Association, Mr. A. Whitehouse, of Birmingham, deals with the type of belt most suitable for the conveyance of gas-works coke. [p. 489.]

Spiral Gasholders.

Mr. S. M. Milbourne concludes his treatise, investigating from a mathematical standpoint, as far as possible, the main loads and stresses induced in the various members which constitute the spiral guided gasholder. [p. 456.]

Forthcoming Engagements

Feb. 26.—JOINT GAS SALESMEN'S CIRCLES.—Visit to British Industries Fair, Birmingham.

Feb. 29.—GAS COMPANIES' PROTECTION ASSOCIATION.—Meeting of Committee, 2.30 p.m., 5, Victoria Street, S.W. 1.

March 1-3.—Joint Conference of the Society of British Gas Industries, British Commercial Gas Association, Institution of Gas Engineers, and National Gas Council, British Industries Fair, Birmingham.

March 2.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Visit to Gothic Works of Messrs. Thomas Glover & Co., Ltd.

March 5.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to Fife Coal Company's Brownhill Colliery, Cardenden. Address by Mr. H. Rule.

March 5.—SCOTTISH JUNIOR ASSOCIATION (WESTERN DISTRICT).—Annual Business Meeting. Address by Mr. W. R. Cone, of the British Road Tar Association.

March 8.—INSTITUTION OF GAS ENGINEERS.—Finance Committee, 10.30 a.m.; Executive Committee, 11 a.m.; Education Executive Committee, 4 p.m.; 28, Grosvenor Gardens, S.W. 1.

March 9.—INSTITUTION OF GAS ENGINEERS.—Board of Examiners, 10.30 a.m.; 28, Grosvenor Gardens, S.W. 1.

March 9.—Joint Visit of MANCHESTER AND YORKSHIRE JUNIOR ASSOCIATIONS to Messrs. W. & B. Cowan's Victory Works, Stretford. Address by Mr. E. Butterworth.

March 10.—B.C.G.A.—Annual Meeting of Lancashire District, Manchester.

March 10.—MIDLAND ASSOCIATION.—Annual Meeting, Grand Hotel, Birmingham.

March 11.—B.C.G.A.—Annual Meeting of Yorkshire District, Leeds.

March 15.—MANCHESTER DISTRICT ASSOCIATION.—Annual Meeting.

March 16.—B.C.G.A.—Annual Meeting of Northern District, Newcastle.

March 18.—SOUTHERN ASSOCIATION. — General Meeting, Hotel Metropole, Northumberland Avenue, W.C., at 2.30 p.m.

March 23.—B.C.G.A.—Annual Meeting of Eastern District, Cambridge.

March 24.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting.

April 8.—NORTH BRITISH ASSOCIATION.—Spring Meeting, Edinburgh.

May 10.—NATIONAL GAS COUNCIL.—Annual General Meeting.

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—General Meeting in London.

June 7-9.—INSTITUTION OF GAS ENGINEERS.—General Meeting in London.

1932 "JOURNAL" Directory.

Page 12, BRODSWORTH; page 56, ROYSTON (YORKS); page 62. SOUTH ELMSALL. The amalgamation of these undertakings, under the name of the Royston and Brodsworth Gas Company, should be noted. Mr. A. C. Taylor is Secretary and Commercial Manager; Mr. J. Pattison, Engineer and Manager. Head Office is at Royston, near Barnsley; 'phone, Royston 7.

Page 115, BIRMINGHAM LIGHTING SUPERINTENDENT. Mr. R. Mason has retired.

EDITORIAL NOTES

Birmingham

A LARGE part of this issue of the " JOURNAL " is taken up by our illustrated description of exhibits of particular appeal to the Gas Industry at what we earnestly hope will prove to be a highly successful display in connection with the British Industries Fair at Castle Bromwich, Birmingham. Last week attention was drawn to the special importance of the Fair at this juncture, when world-wide depression, allied with industrial competition from other countries, is threatening the commercial life of Britain; and we are therefore doubly glad to be in a position to report such comprehensive representation on the part of the Gas Industry. It may be that for the business man encouraging signs are at the moment less easy than usual to discern; but such a time is not one for relaxation of effort. The Gas Industry, as the pages of the " JOURNAL " show, has, when compared with most other industries, a very great deal to be thankful for; and there must be unceasing endeavour to maintain this favourable position. When the Fair opened on Monday, it was found that since last year the permanent buildings at Castle Bromwich had been considerably extended, while an important new outside feature is a quarrying and road-making section. The total number of exhibits shows a gratifying increase, and there are many novelties in the way of British manufactured goods which will make this year's Fair rank high as a national effort. " Buy British," always an admirable slogan theoretically, becomes more completely practicable every day. " But," as " The Times " says, " the really outstanding feature of the Fair is not the novelties it contains, or the new inventions being shown, but the impression it conveys of the quality and solidarity of British industry."

H.R.H. The Duke of York.

At the Mansion House Banquet to celebrate the opening of the Fair:

I am told that there is every reason to believe that the number of buyers who are likely to visit the Fair this year from all over the world will create yet another record. To those representatives of oversea business communities present here to-night I will frankly say that we shall be glad if the success of the British Industries Fair of 1932 eclipses its predecessors. We shall be glad because it will help to bring additional trade, not only to our country, but to all countries; greater prosperity, not only to our people, but to all peoples. For there is a deeper reason than pounds, shillings, and pence for rejoicing over the spectacle of ships laden with that merchandise of ours churning the waters of the seven seas.

The Fair is to remain open until March 4, and throughout the period large attendances are assured. The Gas Industry will, of course, be in specially strong force during the first days of March, when the Joint Gas Conference is to be held. As readers are aware, over this Joint Conference our lamented friend Sir Arthur Duckham was to have presided. His death has, almost at the last moment, left a breach into which Sir David Milne-Watson, always placing the Industry first, has stepped. His action will, we know, be deeply appreciated.

The Gas Industry to the Fore

IN connection with the extension of the permanent Buildings at Castle Bromwich above referred to, it may be mentioned that since last year's Fair no less than 40,000 sq. ft. of extra stand space has been added; the total roofed-in space having now reached the vast area of approximately 13 acres. For this year's Fair the buildings have been re-decorated outside in primrose and green, and the lay-out of the grounds and entrances has been materially changed. There is now a 12-acre car park running the full length of the north side of the buildings, so that cars are able to stop opposite whichever section is the one desired. A buyer can thus go straight to the group of exhibits in which he is primarily interested.

The Gas Industry is again prominent in the provisions for the comfort of visitors. During the 1931 exhibition the total consumption of gas was 4,952,800 c.ft., and it is anticipated that the consumption will be fully maintained this year. For overhead lighting in various parts of the Fair there are in use approximately 160 1000 c.p. high-pressure gas lamps. Over the main entrance there is a 4500 c.p. lamp and two 1000 c.p. high-pressure lamps, while on the Station Approach 13 6-light " Littleton " lamps are used. In addition, some 300 gas pendants and lamps of different kinds furnish the lighting on individual stands and in the kitchens and offices.

No fewer than 130 gas fires contribute to the heating of the dining rooms, conference halls, and executive offices, and sixty circulators, boilers, and other hot water appliances are installed in the kitchens and cloakrooms. In the six kitchens 120 pieces of cooking apparatus are used. These include thirty-two appliances, such as gas cookers, wash coppers, and so forth, which are installed in the new kitchen that is one of this year's additions.

The Gas Industries Section itself covers an area of 41,000 sq. ft. For the decoration of the stands the same striking colour scheme has been employed as was used last year, and the whole Section forms a compact and attractive display.

The Central Information Bureau

THE focal point of the careful planning that has gone to make the Gas Industries Section one of the outstanding features of the Fair is the Central Information Bureau. This is again provided by the British Commercial Gas Association in co-operation with members of the Society of British Gas Industries. The Bureau proved of great service last year, and for the present exhibition it has been amplified in ways likely to assist in the development of the Industry. It has two main objects. It is there to give the buyer expert assistance in any domestic or industrial problem he may raise, and to help him make a survey of new products and methods with a minimum of time and trouble. It is there, too, to impress on inquirers the magnitude and progress of the Industry, and to provide them with statistics illus-

trating the far-reaching and growing activities of gas in the home, the office, and the factory.

The Bureau, which occupies an area of 20 ft. by 56 ft. in the centre of the Section, consists of a central hall and three rooms. It has been built to the designs of Mr. H. Austen Hall, F.R.I.B.A., Consulting Architect to the British Commercial Gas Association. Mr. Hall, who designed the offices of the Metropolitan Water Board and was joint architect of the Town Halls of Lambeth and Holborn and of the County Hall, Reading, has planned a building on simple modern lines. With its outer walls constructed of polished aluminium Plymax decorated by bands of colour, the Bureau gives a dignified finish to the Section. The latest statistics of the progress of the Industry are displayed, and twelve illuminated oil paintings illustrate the manifold uses of gas and its bye-products.

At either end of the building a lounge is provided, where visitors after a tour of the exhibits can rest and discuss specific problems with members of the staff of the Bureau. The expert salesmen who compose this staff are once more loaned by the generosity of the gas supply undertakings. They attend in rotation, so that there is always a number of these specially picked men on duty to answer inquiries or provide information. The readiness of the undertakings to lend their best men and the eagerness to be chosen shown by the salesmen afford a good example of the public spirit in the Industry. The men feel that it is an honour to be selected for this duty, and that everyone, however, experienced, will have learned something to help him in his job when he returns to it at the end of the Fair. A set of photographs of various kinds of gas installations is on view as a guide for visitors before proceeding to make a detailed tour of the exhibits.

There are several additional features in the Bureau this year. At each corner a gas appliance is displayed—at the first corner a gas fire, at the second a cooker, and at the third a gas meter cased in glass so that its workings can be seen and explained. On the fourth corner a gas-operated refrigerator is shown, and, as a further demonstration of the usefulness of this "twentieth century larder," ice creams will be supplied from refrigerators and ice cream conservators to thirsty and weary visitors. Another effective addition is a cascade of hot water falling from a height of 8 ft. into three troughs of coloured tiles. The combination of the bright colours with the moving water and steam is an attractive and interesting method of demonstrating the use of gas for water heating.

The Information Bureau is an excellent witness to the co-operation that obtains in the Gas Industry. This national spirit, constantly seeking the good of the Industry as a whole without considering the immediate reward to individuals, is an integral part of the Industry. As long as our ranks are inspired by this spirit of co-operation, we can face the future with confidence.

Splendid Propaganda

Recently we saw an extraordinarily effective cinematograph film calculated to arouse the greatest interest in the production of coal tar, its treatment by distillation, and, in particular, in the manufacture of creosote and its use as a preservative of timber. Probably many of our readers will be aware that there is a National Creosote Committee of the Association of Tar Distillers in this country, the purpose of which is to extend the markets for creosote. A similar Committee, supported by the chief Continental countries, is engaged on the same task; and the film of which we are speaking has been produced by this Committee. The film treats in a most detailed manner forestry in many parts of Europe, the enemies of wood, the manufacture of creosote, and the use of creosote in wood preservation; and it ought to do a power of good to the coal tar industry in this and other countries.

First we see the felling of timber and its transportation by both rail and water. Then we spend several uncomfortable minutes watching accelerated micro-photographs of the growth of vegetable organisms, and several far more uncomfortable minutes looking at "close-ups" of the most repulsive and destructive grubs and insects at work eating out the life and strength of timber. These have long names and ugly habits, which sicken the senses and stimulate the mind. We must get rid of these at any cost, obviously; and the solution to the problem is, of course, creosote. But "at any cost" is an unhappy phrase. It should be "low cost," as is adequately demonstrated by the film in a series of easily grasped diagrams of comparative costs of treated and untreated railway sleepers.

The film lasts about three-quarters of an hour, and holds the attention throughout, many of the "shots" being spectacular, and much of the treatment novel. What happens when tar is distilled is shown by animated diagrams, which enable the veriest layman to gain a clear picture of the process in a few moments. The animated diagrams are followed up by scenes of various tar distilleries and their methods. The layman must be vividly impressed by the efficiency and magnitude of the gas and coke oven organizations, the high standard of science and economy which marks every phase of the carbonization process and the refining of its crude liquid product, and the care and thoroughness which characterize the creosoting of timber. This is unquestionably a film to be seen, and the producers deserve praise for making a "selling" film of the first rank—splendid propaganda; entertainment which achieves its primary object.

Industrial Competition

It is a sign of the strength of the hold which gas has achieved in industry that the sponsors of this fuel are ceasing to talk so much about the efficiency, cleanliness, and ease of control of gaseous heat, and instead are concentrating on eliminating bad industrial gas practice. There is plenty of scope for healthy criticism of the troubles to which gas is liable if not applied scientifically and with a thorough knowledge of the processes to which it is applied and the aims of the industrialist. In our columns to-day Mr. Windiate, of the Stretford and District Gas Board, offers constructive criticism; he looks at the industrial load squarely, speaks of competition from practical experience, and indicates, also from practical experience, how the sales of gas to industry may be increased—as they *can* be increased. The author's assessment of current competition is a good one; and it is obvious that gas will not progress rapidly unless the outlook in price fixing is the price at which the load can be obtained, rather than the attitude "Our industrial rate is 'x'; if 'x' does not fit the equation, we are sorry." It does not need a genius to say that the Gas Industry must pay its way, and that the industrial load must be a business proposition; but it does need courage and foresight to establish a price based on conditions *plus* a new load, rather than on conditions as they exist without that added consumption. Herein, we suggest, lies the future of industrial—and domestic—gas business.

Rate structures alone will not spell success, of course. There are factors other than the price at which the therm can be supplied to industry which make it a paying proposition to the industrialist who has at his command both oil and electricity. The higher the efficiency (thermal and working) of a gas appliance, the lower the cost of the fuel to the user. This again is quite obvious; but do we as a modern Industry invariably act in a modern manner in tackling the industrial load and facing and overcoming modern competition? Do we acquaint ourselves of the requirements of the user and the working conditions in his factory—to say nothing of the furnace operators themselves? Do we follow industrial research, in this and other countries, and, applying it to practice, modify our furnaces or other equipment? Do we, having installed an appliance, keep closely in touch with the user, maintaining the plant at its highest efficiency? Lately, for example, a great deal of work both in the laboratory and in the field has been done on furnace atmospheres; and Mr. Windiate shows how the application of this new knowledge alone proved sufficient to transfer

an industrialist's affection from oil to gas. Gaseous fuel has a distinct advantage over its competitors in regard to furnace atmosphere; by simple adjustment of the air control, the atmosphere may be maintained in a neutral, oxidizing, or reducing condition, and to any degree desirable. But the highest efficiency of combustion is obtained when the amount of air used for combustion approaches the theoretical figure, and control of atmosphere is often better obtained by a supply of " purging gas."

Two things stand out in Mr. Windiate's paper. First that, if gas is to take its true place in the industrial and manufacturing world, and prove its real qualities, it must be supported by an efficient service—an organization which will periodically inspect and maintain in good condition its past installations with a view to further improvements and the complete satisfaction of the consumer. This organization must be composed of skilled furnace operatives, who will also require to have a definite knowledge of metallurgy, chemistry, and general engineering, besides an understanding of the competitive fuels—in short, a fuel technologist is called for. Secondly, the Gas Industry must be prepared at all times to substantiate its propaganda—in particular, perhaps, its talk about uniformity of supply. Uniformity of pressure at the appliance is essential; and the undertaking is indeed lucky which can assure this without the aid of governors. Our motto is " Governors every time ! "

The Salerni System

In December last we published an extract from a paper by Prof. R. V. Wheeler, of Sheffield University, dealing with the system of low-temperature carbonization developed by Commendatore Piero Salerni, and from that extract our readers will have gathered that Prof. Wheeler is in no two minds about the process; in his own words, " by the Salerni system the admittedly difficult problem of low-temperature carbonization of bituminous coals has been effectively solved." In our columns to-day we give a contribution by the inventor detailing the working of the plant and outlining the fundamental principles involved. It will be agreed, we think, that the manner in which certain difficulties have been overcome is fascinating; and whatever diversity of views there may be regarding the ultimate success of low-temperature carbonization, Piero Salerni's account will prove excellent reading to those at all interested in the problem, or, indeed, in fuel technology in general.

Both the ideas and the aim of the inventor are clearly expressed. His aim is to produce a solid smokeless fuel of high density and calorific value, the latter approximating that of the coal from which it is formed. The other products of carbonization—oil and gas—may be regarded as servants of the main product, for both are utilized in its production. His ideas are that, to prepare this fuel, the charge must be in a state of fine division, be kept in a state of agitation to ensure efficient heat penetration at the low temperature (450° C.) employed, be a blend of coal, semi-coke (also finely ground) made by the process, and oil similarly produced. The blend is charged into a rotating drum; the result is spheroids of high-density, high-calorific value smokeless fuel. The process is, then, in the nature of a duplicate carbonizing treatment, for up to 30 p.ct. admixture of fine semi-coke may be used, and, according to the properties of the coal, definite quantities of oil to act as a binder. To what extent this duplication of heat treatment and the cost of fine grinding will affect the economics of the system remains to be seen.

At any rate, few low-temperature carbonizing processes can claim to have had either as much scientific backing from recognized authorities, or such optimism placed in its ultimate success. And, from the point of view of engineering charm, few processes can claim as much. The principle of the inventor in overcoming mechanical obstacles is to eradicate the causes of the difficulties, instead of attemping to mitigate their effects. Whatever criticism may be advanced of the process under review, we believe that none of our readers will fail to be impressed by the logic underlying Piero Salerni's method of attack. He has concentrated on the mechanics of low-temperature carbonization by external heating in rotating drums; and the means which he has evolved of retaining the strength of the drum, ensuring high thermal efficiency, and eliminating friction between parts which move relatively to one another, are of exceptional interest. The process will stand or fall on the quality of one product—smokeless fuel—and the price at which it can be marketed.

Model Gas-Works Competition

Success far beyond anticipations has, we are pleased to be in a position to report, followed the model gas-works competition organized by Messrs. Newton, Chambers, & Co., Ltd., of the Thorncliffe Iron-Works and Collieries, near Sheffield, with the idea of stimulating interest in the many-sided and fascinating aspects of gas engineering. The competition was to construct from material supplied a model of a gas-works lay-out and provide an accompanying description of the lay-out, in accordance with conditions set out in the " Journal " for Dec. 16 last, when (on p. 727) two photographic views were given of one possible lay-out.

The competition officially closed on Tuesday of last week, and by that date about 110 models had been received or were in course of transit. The models were set out in the Newton Hall, at Thorncliffe, for inspection, and it was seen that, taken as a whole, the quality of the workmanship is extremely high. The models also show much originality in arrangement of the plant. In fact, the response and quality of the entries have been such as to put a hard task upon the shoulders of the Judge, Mr. George Evetts, M.Inst.C.E.; and therefore the indulgence of competitors is craved by the firm should there be some little delay in announcing the results.

Messrs. Newton, Chambers, & Co. are to be congratulated upon having evolved a competition of such interest and educational value.

Joint Gas Conference at the Fair.

Amended Programme.

In consequence of the death of Sir Arthur Duckham it has been necessary to amend the Programme of the Joint Gas Conference which is being held at the British Industries Fair, Castle Bromwich, Birmingham, on Tuesday, Wednesday, and Thursday, March 1, 2, and 3. Sir David Milne-Watson at short notice has kindly consented to take the place of the late Sir Arthur Duckham as President of the Conference, and to deliver a Presidential Address on the opening day.

The opening of the Conference has been postponed from 10.15 a.m. until 11.30 a.m.

The amendments to the Programme of the Conference are as follows:

Tuesday, March 1.

11.30 a.m. Assemble in the Conference Hall, British Industries Fair.

11.45 a.m. Official welcome to members by the Lord Mayor of Birmingham, Alderman J. B. Burman, J.P., and the President of the Birmingham Chamber of Commerce, Mr. E. W. Bache.
Reply by Sir David Milne-Watson, President of the Conference.
Presidential Address by Sir David Milne-Watson, LL.D., D.L.

Wednesday, March 2.

10.15 a.m. Chairman: Mr. J Herbert Canning, F.C.S., President of the Institution of Gas Engineers, Conference Hall, British Industries Fair.

Thursday, March 3.

10.15 a.m. Chairman: Dr. E. W. Smith, C.B.E., F.I.C., Chairman of the Council of the Society of British Gas Industries.

CORRESPONDENCE

Intermittent Vertical Chambers—Bottom Gas Offtakes

SIR,—In your issue of Feb. 10, Mr. H. J. Toogood, of Messrs. Robert Dempster & Sons, Ltd., referring to my letter in your issue of Feb. 3, suggests that they anticipated my firm's bottom gas offtakes by 18 years, and he cites their British Patent No. 1484/1909.

He will, however, agree that that was not quite the same thing, because in that case the top gas offtake was simply replaced by the bottom gas offtake.

The comment of Mr. Grogono and my letter referred to an ordinary intermittent vertical chamber having its main gas outlet at the top, to which my firm, Gas Chambers & Coke Ovens, Ltd., was the first to apply the bottom gas offtake in order to deal with the pressure which is formed in the early stages of carbonizing with certain coals.

While, therefore, appreciating sympathetically your correspondent's remarks, and having the fellow-feeling to which he refers, I must nevertheless point out that he is dealing with rather a different matter.

ARTHUR H. LYMN,
Managing Director.

Gas Chambers and Coke Ovens, Ltd.,
Artillery House,
Westminster, S.W. 1,
Feb. 22, 1932.

Dry Gas Meter—Suggestions on Policy

SIR,—In reply to the gentlemen whose commentary on my letter of the 8th inst. appears in your issue of Feb. 17, I would at once disclaim any intention of implying original authorship of the suggestions put forward. No doubt in similar case to myself, many minds have been turning over these various points for several years, and expression from one angle or another registered at various times. I am quite content to note the interest that is manifest, and in particular that Mr. Rogers should re-affirm his conviction that something should be done.

To Mr. Langford—and through him to Mr. Bingham—I would offer my apologies for having permitted the pressure of other duties to prevent my reading of the paper by Mr. Bingham, which I had set aside for consideration at a convenient opportunity. That we of different company and interests find ourselves in material agreement upon these several items may prove to be the forerunner of fruitful consideration and suitable subsequent action. Regarding item (2) in my letter, I would point out that it does not require any revision of the Gas Meter Regulations to give effect to this proposal. In point of fact, it has already been carried into effect by one meter manufacturer, who has also gone far towards reducing the gradations to a minimum.

With respect to item (3) I am unable to accept the suggestion that the Board of Trade should primarily seek to govern by regulation an issue upon which neither the meter manufacturers nor the Gas Industry in a collective sense have any considered views. Determination of practicability and desire for are surely antecedent to any measure needed to govern the operation of such a requirement.

In passing, I might say that, whereas the existing regulations invest an inspector of gas meters with discretionary powers as to the use of gas or air, the latter—nearly without exception—is used for both registration and absorption. It may be that, when the regulations are revised, air will be laid down as the obligatory standard for all purposes.

Mr. A. T. Gilbert would appear to have a very strong advocate in Mr. Phillips. I would assure him that I have paid due attention to the published activities of Mr. Gilbert. That I have been moved to comment in connection with the paper given by Mr. Preston, and not the lectures by Mr. Gilbert, is purely a matter of personal inclination. It is not so much gas meter construction that I am concerned with, as the effect upon life on the district, a subject upon which Mr. Preston would appear to be well qualified to speak. If Mr. Phillips will divert his attention from Mr. Gilbert for a short time, and attend to the achievements of foreign inventions and manufacturers, he will find that many gas meters (wet and dry) of entirely different principles and characteristics from those of the early days in this country are in more or less successful operation.

So far as "Tempus" is concerned, I could wish that his conclusions were based upon something more than the internal examination of one, and the visible working of another, meter. I would add that the statement of 200 p.ct. overload was one of fact, and not suggestion; also that pressure loss is an integral part of his first two requirements. I am unable to subscribe to his definition of "speed;" 1200 revolutions per hour sounds quite leisurely to me nowadays.

I would assure Mr. Dunn that I am not unmindful of the work done, and reports of the Life of Gas Meters Committee and the Joint Research Committee. With the greatest respect, however, I would beg leave to point out that many changes have taken place since the period referred to, but I fail to observe any particular general progress in the gas meter field. The evolution of the "standard" meter appeals to me as a feeble gesture, carrying with it little conviction, tending to complicate rather than simplify. The old size designations had a definite basis of 6 c.ft. per light, but the numbers applied to the standard meters conveyed nothing but a memory test. Again, what practical value do the odd cubic feet represent in the gradations 210, 420, 540, 720?

I do not yield to another in appreciation of the varied and onerous duties a gas engineer is called upon to perform, but I still maintain that the existing conditions are sufficient justification for my contention that gas meters have not received the share of attention which their effect upon the finances of an undertaking would appear to warrant.

WM. TEMPLETON,
Chief Inspector.

Gas Meter Testing Station,
Gower Street, Leeds,
Feb. 19, 1932.

SIR,—Mr. Templeton should know, after the good show of correspondence in your columns last week, that there are still some prophets left in his own land, although he gives them small credit.

There is also something like irony about an appeal for improvements in meters coming from a representative of a Government Department which tends to hamper improvements rather than facilitate them. Only those who have tried to pilot new ideas through the Standards Department will appreciate what is meant.

The utterances of Mr. Templeton's colleagues at their annual conferences have indicated to the fullest extent that improvements are not courted. However, that the Gas Industry needs improvements in meter construction should be admitted by the distributors of gas. To quote a passage from "Gas Meters" (1924) "There is a great need for meters with smaller case dimensions to deliver the gas with the least absorption of pressure and measure it equably, and the price of such meter to be low enough to allow for scrapping at the end of a useful service."

Another of your correspondents speaks of conclusions arrived at after studying a "glass-cased meter;" and deprecates the possibility of a meter making 1200 revolutions per hour. He also speaks of oval bearings and other troubles. I would advise that gentleman to study a few out of the thousands of 3-light meters taken from our districts every day. These meters in the majority of instances have been supplying gas to cookers, geysers, and other appliances, and in the performance of their duty have, owing to their low revolution capacity, been working at anything from 600 to 1500 revolutions per hour. The examination should be the best guide for future construction, for few are found with "oval bearings" and probably 1 p.ct. with links broken from moorings.

We must look to our *old* stocks (which have stood the rigours of our gas and district conditions) and the *old* construction, which Mr. Preston condemns, for the plans of new designs. After all, what is 1200 revolutions per hour in these days of speed?—20 per minute.

According to my own experience it is not speed which wears bearings: it is the insidious slow motion, at which the inertia of frictional resistance of sticky lineal valves plays havoc with meters, especially where gas is in contact.

In these days of frictionless bearings it should be possible to produce a meter to gladden the heart of Mr. Preston, but it would be difficult to depart from the positive 1815-1930 construction introduced by the eminent engineers mentioned by Mr. Phillips.

The meter industry is fully alive to the shortcomings of the meters in use, but, guided by the scant support given to new models from the buyers and the Standards Department, the manufacturers almost despair of making the wholehearted improvements which are necessary for present-day gas practice.

"METEOR."

Feb. 23, 1932.

The Late Sir Arthur Duckham

The funeral of Sir Arthur Duckham took place on Wednesday last at Ashtead Parish Church; among those present being:

Col. H. W. Woodall, Dr. Charles Carpenter, Dr. Laurence Potts (Chairman of Directors, Leatherhead Gas and Lighting Company), Alderman G. Clark (the Bryan Donkin Company, Ltd., and British Furnaces, Ltd.), Alderman F. J. West (West's Gas Improvement Company, Ltd.), Mr. William A. S. Calder (President, Institution of Chemical Engineers), Mr. Arthur L. Griffith (Secretary, the Society of British Gas Industries), Mr. L. J. Langford (General Manager, Tunbridge Wells Gas Company), Mr. Philip G. G. Moon (Engineer and General Manager, Bournemouth Gas and Water Company), Mr. C. M. Croft (Chief Engineer and General Manager, Wandsworth and District Gas Company), Mr. F. C. Bedloe (Messrs. Drakes, Ltd.), Mr. Phillip C. Pope (Secretary, the Institute of Fuel), Mr. H. Talbot (Institution of Chemical Engineers), Mr. W. L. Galbraith (representing Sir David Milne-Watson), Mr. T. Hardie (representing the Gas Light and Coke Company), Mr. H. E. Bennet (Society of British Gas Industries), Mr. W. H. Bennett (Director, Leatherhead Gas and Lighting Company, and Managing Director, East Surrey Gas Company), Mr. Frank L. Wright (Westwood & Wrights, Ltd.), Mr. John Young (Secretary, Leatherhead Gas and Lighting Company), Mr. D. F. Irving (Chief Engineer, Leatherhead Gas and Lighting Company), Mr. Charles Osenton (Director, Leatherhead Gas and Lighting Company), Mr. Thomas Carmichael (Chief Engineer, Portsmouth and District Gas Company), Mr. S. N. Wellington (Consulting Engineer to Messrs. Woodall-Duckham), Mr. F. S. Astbury (Stourbridge Refractories Company), Mr. F. Vale (Director, Woodall-Duckham), Mr. F. B. Richards (Director, Woodall-Duckham), Mr. J. Reber, Mr. W. J. Sandeman (General Manager, Croydon Gas Company), Mr. F. A. Ricketts (representing the Chairman and Directors of the Mid-Southern District Utility Company), and Mr. Clifford A. King (representing the "GAS JOURNAL").

A Memorial Service was held at St. Martin's-in-the-Fields. Among those present were:

Sir Francis Goodenough, Mr. Thomas Allen (representing Stourbridge Firebrick Manufacturers), Mr. William Cash (representing the Bournemouth Gas and Water Company and the Croydon Gas Company), Mr. J. H. Canning, President, and Mr. J. R. W. Alexander, Secretary (representing the Institution of Gas Engineers), Mr. F. G. Fogg (London Manager, Power-Gas Corporation, Ltd.), Mr. W. J. Smith (Secretary, National Gas Council of Great Britain and Ireland), Mr. J. C. Walker (Secretary, representing the British Commercial Gas Association), Mr. F. C. Tilley (Managing Director, Tilley Brothers, Ltd.), Prof. A. Smithells (representing Leeds University), Mr. F. H. Brooke (representing the Refractory Association and the Oughtibridge Silica Firebrick Company), Mr. Edward Woodall (representing Mr. Henry Woodall), Mr. H. C. Smith (representing the Tottenham and District Gas Company), Dr. F. S. Sinnatt (representing the Fuel Department of the Department of Scientific and Industrial Research), Col. S. S. Ogilvie, Mr. Ralph Halkett (representing the Sheffield Gas Company), Mr. Cuthbert Bainbridge (representing the Nunnery Coke and Gas Company, Ltd., Sheffield), Mr. M. W. Burt (representing Mr. R. G. Clarry, the Chairman, and the staff of the British Road Tar Association), Mr. A. W. Smith, Dr. R. Lessing, Mr. H. M. Thornton, Mr. F. W. Richmond, Mr. William Phillips, Mr. E. J. Fottrell, Mr. Charles F. Botley, Mr. C. Valon Bennett, Mr. E. G. Stewart, and Mr. F. Peirson.

APPRECIATIONS.

We, who were Arthur Duckham's personal friends, feel his loss most deeply. His charm, buoyancy, and comradeship endeared him to us all. From the Gas Industry's point of view we feel the loss none the less severely. He had been connected with it all his business life and has left his mark deeply upon it; when we look to the future we feel that there is a great blank.

At an early date, in association with Col. H. W. Woodall, he invented the Woodall-Duckham retort—a great landmark in gas engineering. He had many difficulties to encounter, but triumphed ultimately over them all, not only by reason of his first-class technical skill and sound engineering ability, but also through his enthusiasm, energy, and salesmanship—he was indeed an ideal salesman. His name will always be remembered as long as the Gas Industry endures.

In public affairs, too, he left his mark. Though his business interests and activities would have fully occupied any ordinary man, he found time to devote himself both during the war and afterwards to public affairs in his country's service. It is only necessary to recall his work on Munitions, on the Sankey Coal Commission, on the Fuel and Power Committee, on the Committee on Mineral Transport, on the Australian Commission, of which he was Chairman, and lastly on the Federation of British Industries, to realize what a wonderful sacrifice he made for his country, and how well he succeeded in the work that he undertook.

He will be mourned by a great circle of friends, who will miss him not only for his personal charm but also for his great knowledge of affairs, which was always at their disposal; and his memory will be very precious to us in the Gas Industry.

DAVID MILNE-WATSON.

How attempt an appreciation of Arthur Duckham? To describe his work and career is simply vain words and idle repetition, and affords no inkling of that gallant, generous, ardent spirit that was Arthur Duckham. We who knew and loved him hesitate to express in public those feelings and memories that lie deep within our hearts.

His genius and versatility, marvellous though they were, held but a second place as compared with a nature so gallant, so generous, so kindly as not only to impress itself on everyone with whom it came in contact, but to inspire them with some of its own strength and courage.

That he should pass on at the very height of his career, when industries and peoples were turning to him for advice and leading, is a national calamity, but no human body could long support the consuming ardour of his spirit; and it is with grateful hearts, though sorrowing, that we remember the friend and colleague who did so much for us in his life and has left us in his work and inspiration a priceless heritage far beyond the expression of words.

H. W. WOODALL.

It was indeed a sad blow to me to have the news of the sudden death of Sir Arthur Duckham, who, for many years, was one of my most valued friends.

I was a pupil of the late Mr. Frank Livesey when he was Chief Engineer of the South Metropolitan Gas Company. I was followed by a Dutchman from The Hague, and after him came Arthur Duckham—"Bob" Duckham, as he was even then known. I had stayed on with the South Metropolitan Gas Company, and I remember Mr. Frank bringing him down and introducing him to me. After Mr. Frank had left the room Duckham, in that wonderful way which he always had, said "I am a nice child when you know me;" and that has always seemed to me to describe in his own words the very large and genial personality which belonged to him and which endeared him to everyone he met.

After I left Old Kent Road to go to Bournemouth, Duckham, on the termination of his articles, also stayed with the South Metropolitan Gas Company as an Assistant to the Chief Engineer; and before I left Bournemouth he followed me there as Junior Assistant and succeeded me as Chief Assistant when I came to Winchester. Mr. P. G. G. Moon, the present Engineer and General Manager at Bournemouth, took Arthur Duckham's place as Junior Assistant, and succeeded him as Chief Engineer when he left.

To say that Sir Arthur's death last week came as a shock to me hardly describes the position—I had always regarded him more as a brother than as a friend.

H. C. HEAD.

The sudden death of Sir Arthur Duckham has stunned his many friends in Birmingham. It is difficult to realize that we have lost for ever his inspiring personality from our counsels. He was often in Birmingham, and was in my office only a few days before his death, expounding his views upon the proper operation of tariffs in this country.

He had a breadth of vision, a freshness of mind, and, above all, an incorrigible optimism which always acted as an invigorating tonic to those who were fortunate enough to possess his friendship. His viewpoint was often unconventional, but always stimulating. He possessed, unconsciously, the power of lifting those with whom he conversed on to the high plane from which he appeared to survey the many problems which it fell to his lot to deal with. The same enthusiasm entered into both his work and his play.

Many of us will treasure the golf clubs which he from time to time distributed among his friends.

It was a great joy to be in his company at all times, and his passing has left a big gap, not only in the Gas Industry, but also in the hearts of his many friends.

A. W. SMITH.

The sad news of the passing of our friend in the very midst of his manifold activities comes as a shock to those who remain to carry on. It is not easy to express the deep sense of loss which is bound to be felt by those who have the welfare not only of the Gas Industry, but of the general industrial community, at heart.

Sir Arthur was truly a great man; his mind was capable of dealing with matters nationally and internationally, and his influence for progress in our Industry will be fully realized only in retrospect. His genial manner towards and personal regard for workers in the Industry were equally manifest whether dealing with the humblest operator or the greatest controller.

The bright light of honest endeavour shone in his eyes as he sat at one's desk and described ambitious plans for the economic improvement in the use of the nation's fuel resources. I shall never forget his delight when, in 1924, the Provan plant carbonized its first million tons of coal and when maintenance costs were described officially as negligible.

Last year, at the Spring Meeting of the North British Association of Gas Managers at Falkirk, I sat beside him and referred to the historic visit to that town, towards the end of the eighteenth century, of a French delegation of Research Chemists and Engineers whose great work was still being carried on by experts in carbonizing and metallurgy. I ventured the opinion then that such men are only beginning their work when they pass from our ken. Little did we realize then that within twelve months the summons to Sir Arthur would be answered.

He has been called from our midst, but we who remain are inspired by his great example to emulate him in the cause for which he toiled so unremittingly.

J. W. MCLUSKY.

PERSONAL

The Parkinson Stove Company, Ltd., have appointed Mr. LESLIE C. H. ATHILL, of Messrs. Leslie C. H. Athill & Co., to the position of London Manager.

Mr. J. W. STURDY, Manager to the Easingwold Gas Light and Coke Company, Yorkshire, has been appointed to the Board and given the post of Managing Director.

The Richmonds Gas Stove Company, Ltd., have appointed Mr. ROBERT POOLE to the position of Secretary to the Company and Commercial Manager at Warrington.

THE NEWS OF THE WEEK

At a Meeting of the Coventry City Council recently the Joint Gas and Electricity Committee recommended that approval be given to a scheme for the provision of gas and electricity showrooms on adjacent sites at Corporation Street at an estimated cost of £27,618, to be shared by the two undertakings.

The German Union of Gas and Water Engineers will hold their annual meeting in Essen on May 30 next, when meetings will also be held of the Economic Union of German Gas-Works. The annual gathering of the Czecho-Slovakian Association of Gas and Water Engineers is to be held in Prague on July 1 and 2 next.

A Proposal is to be made shortly that Stonehaven Town Council acquire the local gas undertaking. The local paper expresses the opinion that the proposal will arouse a great deal of controversy. At the moment there is no electricity in the town, but there is a prospect of a supply of electricity being obtained shortly.

Experiments Have Been Made in Commercial High Street and Bridge Street, Newport, Mon., with an improved type of street lamp at a cost of £80 for 13 fittings, and it has been reported to the Lighting Committee of the Corporation that a saving of about £13 a year would be thereby effected. The Committee deemed the experiment satisfactory and decided that the improved types of lamps be erected in other parts of the main roads.

Penrith's Record Consumption.—The annual report of the Engineer and Manager (Mr. J. Corrigan) of the Penrith (Cumberland) Gas-Works, submitted at a meeting of the Urban Council, stated that the gas sent out last year, 85,008,500 c.ft., constituted another record in the history of the undertaking. On the manufacturing side the coal carbonized for the year had for the first time reached a total of 6000 tons, and the slight increase in the average make per ton of coal carbonized, from 14,003 to 14,020 c.ft., represented a further considerable saving in the fuel used.

Institution of Gas Engineers.

The Headquarters of the Institution of Gas Engineers during the Joint Gas Conference at the British Industries Fair on March 1, 2, and 3 will be at the Queen's Hotel, Birmingham, where the Secretary of the Institution will be staying, or at the Gas Industries Information Bureau at the Fair at Castle Bromwich, Birmingham.

Mr. Alexander will represent the Institution at the second Council Meeting of the International Gas Union at Basle on Friday, Feb. 26. The American Gas Association has recently become a member of the Union, to which most countries having National Gas Associations now belong.

Information concerning the Chicago International Exposition—"A Century of Progress"—to be held from June 1 to Nov. 1, 1933, can be obtained from the Secretary of the Institution, 28, Grosvenor Gardens, London, S.W. 1.

Mr. Alexander represented the President of the Institution of Gas Engineers at the Annual Dinner of the Institution of Chemical Engineers at the Hotel Victoria, London, on Feb. 19.

Mr. C. Valon Bennett, Member of Council, represented the President of the Institution of Gas Engineers at the British Industries Fair Dinner of His Majesty's Government, at the Mansion House, London, on Feb. 22.

Mr. John Terrace, Past-President and Member of Council, will represent the President of the Institution of Gas Engineers at the Annual Dinner of the Institution of Civil Engineers at the Savoy Hotel, London, on March 2, 1932.

Midland Junior Gas Association.

By the courtesy of the City of Birmingham Water Department, members of the Midland Junior Gas Association visited the Frankley Works and Reservoir on Saturday, Feb. 13. The visitors were received by the Resident Engineer, Mr. Sisman, and spent a most instructive afternoon.

The reservoir at Frankley receives the water brought down by the aqueduct from the Elan Valley. The water from the aqueduct flows through a recording gauge chamber into the Frankley storage reservoir of 200 million gallons capacity, and then passes on to slow sand filters of a total area of fourteen acres. From the filters the water flows to one or other of two communicating covered pure water tanks, and from these the greater portion flows by gravitation to the distribution system in the district of supply.

THE NEWS—*continued.*

London County Council and Prepayment Gas Meters.

At a meeting of the London County Council on Feb. 9 the Public Control Committee's report, which was discussed, proposed that no objection be raised to the provisions of the Bills of the Commercial Gas Company and the South Metropolitan Gas Company relating to the maximum charges which may be made in respect of the hire of prepayment meters and fittings, provided that an assurance is given by the respective Companies that the receipts which they may obtain from any charges made under the powers contained in the clauses (if passed) shall not amount to more than the cost of the hire of prepayment meters and fittings and other services in connection therewith.

The charges are now limited by the Metropolis Gas (Prepayment Meter) Act, 1900, as amended by certain Acts and Orders. The Act of 1900, which was promoted by the Council, applies to the Gas Light and Coke, the Commercial Gas, and the South Metropolitan Gas Companies, and provides that the Companies shall not charge for gas supplied through a prepayment meter any greater amount than they are entitled to charge for gas supplied to private consumers through any other kind of meter or by any other method. The maximum charge for prepayment meters and fittings was fixed by the Act at 10d. per 1000 c.ft., and such charge included the provision, hire, letting, maintenance, and other costs of such a meter and fittings. On the transfer from the volume to the thermal system, this charge was fixed at 2d. a therm in the case of the Commercial Gas Company and 1¾d. a therm in the case of the South Metropolitan Gas Company. These amounts were fixed as equivalent to that specified in the Act of 1900, and there has, therefore, been no real change since 1900 in the maximum amounts which could be charged for prepayment meters and fittings.

It is proposed in the Bills to obtain power to increase to 3d. a therm the maximum amount which can be charged by the two Companies. Separate accounts which have been kept by the Companies in respect of prepayment meters, charges, and fittings and are audited by the Board of Trade, show—

(*a*) *Commercial Gas Company.*—That the extra cost of supplying gas by prepayment meter has been from 2·39d. a therm in 1926 to 3·09d. a therm in 1930 and that the excess of extra expenditure over extra receipts (namely, the net cost to the Company) has been from 0·44d. a therm in 1926 to 1·13d. a therm in 1930.

(*b*) *South Metropolitan Gas Company.*—That the extra cost of supplying gas by prepayment meter has been from 2·14d. a therm in 1926 to 2·35d. a therm in 1930, and that the excess of extra expenditure over extra receipts (namely, the net cost to the Company) has been from 0·53d. a therm in 1926 to 0·70d. a therm in 1930.

In the case of both the Commercial Gas Company and the South Metropolitan Gas Company, the present cost of supplying gas by prepayment meter is in excess of the maximum charge now authorized. In the case of the Commercial Gas Company the actual cost in 1930, as shown above, exceeded the maximum charge sought to be authorized.

At the meeting on Feb. 9 Mr. Charles Latham, F.L.A.A., moved an amendment in favour of opposing the Bills. He said that the prepayment meter was a device to protect gas companies against bad debts. It was difficult to believe the figures given as to the rise in cost of gas supplied by prepayment meter between the years 1926 and 1930. If the alleged loss which the Gas Companies were stated to make in supplying within the existing maximum of 2d. per therm were available, it would go to enable a reduction in the price of gas to be made over the whole of the consumers. In the opinion of the Labour Members no case had been made by either of the Companies for any modification of the existing maximum of 2d. a therm. On the other hand, proposals should be before Parliament which would indicate that both these Companies were competitively efficient enough to reduce the maximum rather than ask for powers to increase it.

Mr. H. Berry, A.M.I.Mech.E., in seconding the amendment, argued that gas companies using prepayment meters were saving a tremendous amount of booking, bank charges, and waste. Their money was paid in advance and they were sure of it.

Mr. Charles J. Allpass (Chairman of the Public Control Committee) observed that the Comptroller of the Council submitted figures to the Committee which substantially justified the Companies' suggestion that they should charge extra on the meters. Both Companies so conducted their affairs that they had their costs allocated most minutely to all the various sections of their business, and were therefore able to produce accurately and correctly the cost of prepayment meters. All that was asked was that costs and receipts should have some relation to one another. He was unable to accept Mr. Latham's amendment.

Mr. J. H. MacDonnell declared that it was the poorest of the poor who had to use the penny-in-the-slot meter. He had used it himself and found it terribly expensive. There was only one solution of the gas meter problem, and that was for the London County Council to take over the gas supply of London.

On a division, the amendment was defeated by 77 votes to 33, and the recommendation of the Committee carried.

Mansfield and a Bulk Supply.

At Mansfield, which is the most populous town in Nottinghamshire outside the capital of the county, a scheme is under the consideration of the Corporation for supplementing the resources of the municipal gas undertaking by obtaining a bulk supply of gas from neighbouring collieries.

From its situation in the midst of one of the richest coalfields in England, Mansfield possesses exceptional advantages for carrying out such a project. Negotiations have been opened up with neighbouring colliery proprietors, and upon the result will depend whether plans which were prepared two years ago for the extension of the present gas-works at an estimated cost of £74,600 are to be carried out. The execution of these plans has been delayed in view of the possibility of obtaining colliery supplies.

New Vertical Retort Plant at Colne.

Recent important municipal developments at Colne include the installation of new vertical retorts at the gas-works. The inaugural ceremony was performed on Feb. 18. The ceremony was presided over by the Mayor (Councillor J. King); and Alderman J. E. Keighley, J.P., Chairman of the Gas Committee, who set in motion the machinery which operated the new plant, paid a tribute to the Engineer and Manager (Mr. Fred Thorpe) and his staff for their able work.

The new installation is by Drakes, Ltd., of Halifax. The bench is built in three beds, one containing eight retorts and two containing four retorts each, set on Drakes patent principle. Each retort has a guaranteed coal throughput of 4½ tons per diem, and, in addition, is capable of being steamed up to 25 p.ct. of its throughput. The bench has a nominal gas making capacity of 1,500,000 c.ft. of gas per diem, the calorific value of the gas being 425 B.Th.U. per c.ft. Provision has been made in the house for the future installation of another bed of eight 4½ ton retorts, raising the gas-making capacity of the plant to 2,250,000 c.ft. per diem.

The retorts are arranged in units of two, set in entirely separate chambers, each of which has an independent supply of producer gas and secondary air, and is provided with waste gas flues and control dampers, thus permitting the temperature of any two retorts being under absolute control throughout their entire length, or isolated as required. The retorts are oval in shape and 25 ft. long overall, and, except for the portion in the cooling chamber and the fireclay mouthpiece at the top, are constructed throughout with tongued and grooved silica blocks of Meltham manufacture. The chambers containing the retorts have an independent silica lining, composed of the same quality material as the retorts, the brickwork forming same, being independent of any other brickwork, permits of uniform expansion and contraction throughout the length of the retort.

In the Drakes system of setting, the producer gas travels downwards against gravity, thus guaranteeing a uniform distribution of gases, permitting the temperatures of the retorts to be regulated in any manner to suit the varying requirements of different coals, and allowing for the manufacture of a coal gas of any required calorific value, regardless of the throughput below the guaranteed quantity.

The producers are arranged on the ground floor level and in front of the setting. There is one large producer for operating the bed of eight, and a twin producer for the beds of four. The larger producer is fitted with twin grates and the twin producers with individual grates, these being of Drakes patent hanging bar type. A waste-heat boiler of the Bonecourt firetube type is installed.

"The Contractors," states a brochure prepared for the occasion, "have carried out the work in a very capable manner and within the time specified—namely, nine months. They have willingly, at the request of the Gas Engineer, and without additional charge, built into the scheme new features which were not originally specified,

and generally the work is a credit to the firm and a monument of which they may well be proud. The installation is Messrs. Drakes' patent, and constructed throughout of British materials."

On Aug. 26, 27, and 28, 1931, the official test was carried out, the coal used being a blend of screened nuts from five pits—four in Yorkshire and one in Lancashire. No allowance was made for ash or moisture in the coal, and the heats of the settings in none of the chambers exceeded 1410° C. The average throughput of the retorts was 4 tons 13¾ cwt. per 24 hours, with a make of 20,533 c.ft. of 426·8 B.Th.U. gas, equal to 87·6 therms. The fuel consumption was 14·6 p.ct. Seventeen gallons of tar were produced per ton of coal, and the coke (dry) available for sale was 8·75 cwt. per ton. In every case the test exceeded the Contractors' guarantee.

Cookery Demonstrations at Newmarket.

Before the war the cookery demonstrations given by the Newmarket Gas Company were eagerly looked forward to by the housewives of the town, and the announcement that cookery demonstrations and a gas exhibition had been arranged by the Company for Feb. 9, 10, 11, and 12, was warmly welcomed. The demonstrations and exhibition took place in the spacious upper main room at the Town Hall Buildings, and, although the weather on Tuesday afternoon was most unpleasant, the room was well filled when the opening demonstration took place. There was a brief formal opening by Mr. J. L. Jarvis (a Director of the Gas Company), who was supported by Mr. J. H. Troughton (Chairman and Manager), Capt. T. R. Leader, Mr. F. Wellsman (Directors of the Company), Miss Baker, the demonstrator, and Miss Dick, representing the British Commercial Gas Association.

Mr. Troughton made a few introductory remarks.

Mr. J. L. Jarvis said that the demonstrations and exhibitions had been organized to show the unparalleled advantages of gas as a fuel. Miss Baker, a first-class diplomée of the National Teachers' School of Cookery, would be the demonstrator, and Miss Dick, representing the British Commercial Gas Association, would also explain some of the numerous uses and advantages of gas. Miss Dick had been a sanitary inspector, and an inspector under Dr. Addison's Housing Commission.

Miss Baker, before beginning her cookery demonstration, explained the special features of the "Radiation New World" gas cooker, with "Regulo" automatic oven heat control, single oven burner, and direct bottom-flue outlet, which she was about to use.

The exhibitions of gas appliances, made by the Newmarket Gas Company in conjunction with Radiation, Ltd., was an extraordinarily interesting one. Wright's "Eureka New World" regulo-controlled gas range may be taken as a typical example of the latest and most up-to-date gas cooker, while also exhibited were the "Sunhot" boiler, gas refrigerators, and an example of the new "Cobble-Beam" fire, besides a notable range of "Beam" radiant gas fires. The Company were also showing Ewart's geysers and water heaters of all the latest patterns.

Co-Partnership in Liverpool Gas Company.

The happy relations which exist between the Directors and management of the Liverpool Gas Company and the employees were again apparent at the sixth annual co-partners' concert, held on Feb. 15 in the Central Hall, Liverpool.

Mr. Alfred Tyrer, Deputy-Chairman, who presided, expressed regret at the absence through indisposition of Sir Henry Wade Deacon, the Chairman, and paid a tribute to the splendid work Sir Henry had done for the Company and its employees. A resolution of sympathy and hope for his speedy recovery was passed.

Dr. G. C. Clayton, M.P., a Director, alluding to the fact that the co-partnership scheme comes of age this year, gave some illuminating figures of its progress. In 1911, he said, the Directors launched it as a means of promoting the employees' welfare, and, by paying a bonus over the standard wages, giving them a financial interest in the Company, which was allied to greater security of employment. The result had been an increasing feeling of confidence, while £165,736 had been distributed in bonus. At present there were 2281 co-partners, and their interest in the Company, including savings, bonus, and ordinary stock, totalled £146,541.

Company's 115 Years' Record.

The financial, however, was by no means the only benefit, for the scheme promoted good citizenship, self-respect, a wider outlook, good fellowship, and happiness. Sports and recreational activities were also encouraged by the provision of adequate facilities. They were all proud that the supply of gas had been maintained without interruption by the Company for over 115 years.

Certificates for long service were presented to the following, each of whom headed the list in his own Department: Matthew Major (Linacre, 52 years' service), Thomas Cooch (Wavertree, 38 years), A. Newton (Garston, 36), A. Macdonald (Distribution, 36), J. Ellams (Eccles Street, 36), T. Prendergast (Athol Street, 36), and W. G. Bridden (Treasurer's, 36).

Following the speeches the large audience enjoyed a musical programme, in which members of the staff took a prominent part.

Gas Lighting in Workshops.

In a talk to the British Works Management Association at the Rubens Hotel, London, on Feb. 18, Mr. E. L. Oughton, of the South Suburban Gas Company, said that it is not generally appreciated that gas lighting installations, in addition to supplying the necessary illumination, definitely assist ventilation and prevent downdraughts in any normal workshop by virtue of the heat resulting from the combustion of the gas and the subsequent air movement created. Improved ventilation and diminution of draughts tend towards a great decrease in colds, &c., which reduce the efficiency of the worker and the output of work.

Also, there has been an important development in the application of gas lighting in relation to the direct ventilation and controlled humidity conditions in a South London factory engaged in the manufacture of piano and other musical instruments. Special "Metro" lamps directly connected to a ventilating duct system, fan-operated, were installed, with the result that the humidity of the rooms gas lighted is lower than those electrically lighted. This principle is also applicable to all cabinet makers and printing works where ruling is done on a large scale, and other trades where a lower humidity value is essential.

The control of gas lighting units is now absolutely positive and reliable, whether in single units or groups of lamps. The modern systems of control are the "Newbridge" positive switch and the Sugg patent distance control device. The positive switch can now be obtained to function without the need of a permanent by-pass, though the by-pass consumption is only 0·2 to 0·25 c.ft. per hour.

The lighting efficiency of a gas installation in a workshop, when regularly maintained—*i.e.*, reflectors dusted and faulty mantles replaced—is quite 80 p.ct., and the 20 p.ct. depreciation factor would be reduced further with weekly dusting, &c. The over-all depreciation of other lighting systems is greater than this. The maximum efficiency of a gas lighting installation depends upon the use of scientifically designed burners and lamps with a constant governor-controlled pressure.

Gas Potential Investments.

[Extracted from the "Financial Times."]

Maidstone.

The Maidstone Gas Company was incorporated by Special Act in 1858, and its statutory area covers nearly 80 square miles, including Maidstone, Bearsted, Sutton Valance, and adjacent parishes, with a population of some 60,000.

The fixed standard price of gas is 15·8d. per therm. Several reductions have been made since the coal strike period, and the rate now is 9·2d. and 10·8d. to certain outlying areas. Ordinary stock dividends are subject to the usual sliding scale.

Against the capital expenditure, a total of £13,658 has been written off for depreciation of stoves and fittings and certain sales. It has been the practice to pay a dividend of 4 p.ct. at the half-year, and the last one was paid in August. The total authorized share capital is £197,640 (£75,000 includes premiums), of which there is issued £165,736 of 5 p.ct. capital stock, *plus* £17,387 premiums. The dividend on this has been maintained at 8¼ p.ct. since 1922. At the current official quotation of 128, the stock gives a return of 6½ p.ct.

Borrowing powers are one-half the paid-up capital, including premiums. The total loan capital outstanding is £56,176 in 3 p.ct. perpetual debenture stock, which is now officially quoted at 56 to return 5⅜ p.ct. per annum.

Watford.

The Watford and St. Albans Gas Company was established in 1834 as the Watford Gas and Coke Company, and incorporated by Special Act in 1871. The present name was adopted on the acquisition, as from Jan. 1, 1930, of the St. Albans Gas Company. As from Oct. 1, 1930, the undertaking of the Elstree and Boreham Wood Gas Company was absorbed, and the Hemel

THE NEWS—continued.

Hempstead District Gas Company was transferred to the Company on April 1, 1931.

With these added districts the statutory area of supply covers over 70 square miles, including the City of St. Albans, the Borough of Watford, and parts of several rural districts. The Company also supplies in bulk to the Rickmansworth Urban District Council for the towns and districts of Rickmansworth and Chorley Wood, and entered into an agreement, effective in December last, to supply all the gas required by the Welwyn and Hatfield Gas Company for 21 years.

Dividends are subject to the usual sliding scale. The interim ordinary dividend (3⅜ p.ct.) was paid last year on Aug. 27.

York.

The York Gas Company was incorporated by Special Act in 1823 as the York Gas Light Company and amalgamated with another Company by the Special Act of 1844 as the York United Gas-Light Company. The name was changed in 1912. The statutory area of supply covers 154 square miles and includes the City of York, together with all the adjacent district lying within a radius of seven miles.

Besides being the capital of the county, the City of York is the Archipiscopal See, the headquarters of the Northern Primacy and of the Northern Command. It is also an important railway centre, where, in addition to extensive workshops for the construction of rolling-stock, there are large administrative offices, while a great variety of important industries have long been established there. These numerous interests have attracted a very large population resulting in the steady expansion of the Company's business and the enlargement and modernization of the plant and distribution system.

The authorized standard price of gas is 13d. per therm and the present selling price 7½d. Dividends are subject to the usual sliding scale.

It is the declared financial policy of the Board to keep the dividend at 5 p.ct. for the present in order to utilize the surplus for the purpose of completing the up-to-date equipment of the plant and of conserving resources so as to strengthen and consolidate the Company's position and capacity for an efficient and cheap service. During the five years £7000 was provided out of revenue for a gasholder and £9300 for contracts.

The unissued capital may be issued as ordinary (6 p.ct. standard) or preference (dividend not to exceed 5 p.ct.).

Borrowing powers are one-half the paid-up capital stock. There is exercised and outstanding £35,000 of 3¾ p.ct. debenture stock and £89,395 of 5 p.ct. debenture stock. The latter is quoted at 93 to return 5⅜ p.ct.

LOW-TEMPERATURE CARBONIZATION

An outline of the peculiar features of the Salerni System

By Commendatore PIERO SALERNI

It cannot be said too often that the main, if not the only, function of low-temperature carbonization should be to transform bituminous coal, with the least practicable decrease of its calorific value, into a smokeless fuel in blocks of useful size and good mechanical strength. Consequently, the fewer the bye-products obtained in the process, at the expense of calorific value of the original coal, the better. The only bye-products admissible are, therefore, those obtained from the smoke-giving constituents of coal—namely, liquid hydrocarbons. It is fortunate that in the process of extracting these, a sufficient volume of gas is usually evolved to provide, after removal of light oils, the fuel necessary to supply the heat requirements of the process.

Semi-coke produced at the comparatively high temperatures used in low-temperature carbonization retorts of the static type is usually a fuel which, because of its insufficient density and low calorific value, cannot be said to be an entirely satisfactory substitute for bituminous coal for general purposes.

To obtain fuel of the quality required, a temperature of about 450° C. must not be exceeded in the process. External application of heat by the agitation method has proved to be an efficient means—indeed, the only known practicable means—of heating a charge of coal uniformly to the required temperature of about 450° C. It is therefore permissible to say that the agitation method of heat transference propounded by me many years ago offered a satisfactory solution to the fundamental problem of low-temperature carbonization as a process applicable to the treatment of all the bituminous coal at present burnt in the raw state.

But the agitation method necessitates the use of moving parts and therefore involves problems of mechanics which do not arise with systems of the static type.

On the other hand, static systems involve a problem much more serious than that of mechanics—namely, that of providing materials of construction which will resist the much higher temperatures which must be used to transmit heat to the charge. It should be borne in mind that the strength and resistance of materials decreases very rapidly with even small increases of temperature.

A PROBLEM MAINLY OF MECHANICS.

The problem of strength of materials is serious enough even with the lower temperatures used with the agitation method. At the temperatures needed with the static method it becomes decidedly forbidding. But, apart from this, inasmuch as by the static method the product most desired—a dense fuel of a calorific value approximating to that of the original coal—cannot be produced at all, it cannot be accepted as a satisfactory alternative for the agitation method however great the mechanical difficulties which the latter might present. The conclusion is that low-temperature carbonization is, and has been for years, a problem mainly of mechanics. Nevertheless, the provision of means of securing the production of semi-coke of the requisite degree of density and of oil unpolluted by dust by a process capable of application under all conditions, and the question of strength and resistance of materials of construction under conditions of continuous and prolonged heating at even the lower temperatures involved in the agitation method, presented problems of another order.

The Salerni system offers a solution to all these problems by means which, though novel, depend for satisfactory working solely upon well-established principles and laws and do not involve the use of devices which have not proved satisfactory in practice on an industrial scale over a prolonged period.

THE PROCESS.

Briefly put, the process consists in heating to a temperature of about 450° C. by the external application of heat, in a retort of the revolving drum type, a blend of comminuted coal and semi-coke, so finely ground that its porcus structure is destroyed, pitchy fractions of the oil from the process itself being added to the blend. The blend is introduced at one end of the drum; it travels through it and is discharged at the other end in the form of coke—introduction, travel, and discharge taking place continuously by gravity action.

On reaching the temperature at which coking begins, the charge tends, owing to the rumbling action, to form itself into spheroidal blocks in the same way as in other well-known processes of the agitation type. The size of the spheroids formed depends mainly on the degree of agglutinating property of the blend; and this, in the Salerni system, is regulated by the proportion in which coke and oil are used in the blend.

In some systems the agglutinating property of the mass in treatment is regulated by a partial destruction of that property, secured by the device of preliminary oxidation of the coal, a process rather delicate to control and objectionable in other respects. In other systems the agglutinating property of the coal is not tampered with, but its effect in the charge is reduced by blending a proportion of a dense non-agglutinating substance, an incidental but very important effect of the addition being to increase the apparent density of the coke spheroids ultimately formed.

The basic difference between known systems of the latter type and the Salerni lies in the fact that in the Salerni

the non-agglutinating substance for the blend is obtained from the process itself, being coke breeze ground to the extent required to suppress porosity; a comparatively light product is thus transformed into one of much higher density—whereas in the older systems an extraneous substance, such as anthracite duff, is used for the purpose.

A further difference lies in the fact that in the Salerni system additional cementing substance is added to the blend in the form of heavy oils from the process itself. Therefore, while on the one hand the agglutinating property of the charge is reduced by the incorporation of a dense non-agglutinating substance, on the other hand, additional cementing substance is added in order to render possible the incorporation of a greater percentage of the dense substance than the normal agglutinating property of the coal will admit. The result is that a coke is ultimately produced of an apparent density greater than that which would have otherwise been obtained; and inasmuch as both the solid and liquid substances added to the blend have the effect of materially increasing the conductivity of the charge, the output of the retort is also increased.

The addition of heavy oils to the blend presents the incidental advantage of preventing the raising of dust in the retort, thus removing the cause of one of the great troubles involved by the agitation method of heat transference—namely, distillates polluted with dust.

The non-coking substance for the blend being derived from the process itself, it is always available, the system being thus capable of application in all circumstances. Inasmuch as a large percentage—usually about 30 p.ct.—of the semi-coke produced is ground and used for the blend, an ample margin is provided within which breeze can be allowed to form in the retort without disadvantage, for it is obviously as easy to obtain coke powder by crushing breeze as by crushing coke lumps, as would, in any case, have to be done if the process were to yield no breeze.

The addition of coke breeze to a charge of coal in process of carbonization is not in itself novel. The novel feature is that the breeze added is in such a state of comminution that its apparent density coincides with its real, its addition therefore resulting in a material increase in the average density of the blend and therefore of the ultimate product.

The addition of a high percentage of finely-ground coke to the blend has the effect of materially increasing its heat conductivity, which is further appreciably increased by the introduction into the blend of the pitchy fractions of the oil. The conductivity of the charge in treatment is thus so greatly increased that the ultimate output of coke from the retort is, with certain coals, actually somewhat greater than it would be if no portion of the charge were passed a second time through the retort.

The introduction into the blend of the pitchy fractions of the oil from the process results not only in an improvement in the quality of the oil ultimately produced, by keeping it free from dust, but also in a somewhat higher ultimate yield of lighter oils, for, in the process of re-distillation, a portion of the heavy fractions becomes cracked into lighter fractions, while the residual pitch, a product otherwise of negligible value, is put to good use because it serves to increase the calorific value and flaming properties of the coke.

A recent development is the application of the process to the treatment of non-coking coals even when coking coals are not available for blending with them. This feature widens its scope to the whole field to which it was intended to make it applicable—namely, to the treatment of all the bituminous coal, whether coking or non-coking, which is at present burnt in grates in the raw state. Coke of excellent quality is produced from non-coking bituminous coal by blending with it, in addition to coke powder and the pitchy fractions of the oils yielded from the coal, a proportion of high-temperature pitch somewhat smaller than is used in the manufacture of briquettes. More than half the pitch so added is recovered during the treatment, so that the expense incurred by the provision of pitch is less than half that involved for binder in the manufacture of briquettes.

The results thus obtained with non-coking coals were so satisfactory that attempts were made to manufacture lump fuel from anthracite dust blended with high-temperature pitch. The attempts were unsuccessful, though blends of anthracite, a non-coking bituminous coal, and pitch yielded a good fuel.

Characteristics of the Salerni System.

1. Friction between parts which move relatively to one another is non-existent, no such parts being anywhere in contact.

2. Loss of rigidity and strength of the structure through heating is avoided, structural parts not being heated.

3. Distortion of the structure due to normal or accidental unequal heating is avoided, the heated parts having no structural function and being small and left free to expand without affecting the structure.

4. Undue damage to the materials of construction through overheating in normal operation is precluded, while accidental over-heating is rendered impossible by self-governing means.

5. Uncontrolled mechanical actions being non-existent, the life of the retort can be predetermined, only known factors—namely, wastage of material through heating and through abrasion by the blend in treatment—having to be taken into account.

6. Waste of power due to inordinate friction between moving parts and unnecessary weight of the retort structure is avoided.

7. Wear of and damage to the heating surface by the means provided to counteract sticking of the charge to the heating surface and choking of the retort are totally eliminated, the means provided for the purpose being balanced and virtually frictionless. Moreover, inasmuch as they are normally held clear of the charge in treatment interference with the normal process of coke formation and "balling-up" is avoided.

8. Although no mechanical means of discharging hot coke are employed, danger of blockage of the discharge orifice does not exist, the retort being left open, coke being discharged by gravity, gently and without breakage.

9. Coke production and discharge and, therefore, the working of the system are open at all times to visual observation.

10. Clear indication of the temperatures in every section of the retort being available, regulation of heating to a pre-determined optimum is possible and easy.

11. Optimum heating conditions throughout the length of the retort are, once determined, maintained by self-governing means.

12. Working conditions being everywhere kept constant by automatic means, supervision of a large installation, from a control house, by a single man is possible.

13. Fire in the retort is impossible, as accidental development of negative pressure cannot admit air into the retort.

14. Danger of explosion is non-existent, the gases not being confined in the retort by mechanical means.

15. Loss of distillation products by leakage from the retort is impossible.

16. No brickwork or any heat insulating material is used in the system other than the lining of the combustion chambers.

17. Owing to the increased conductivity of the charge, the capacity of the retort per unit area of heating surface is greater than the normal.

18. Radiation losses are totally excluded, no heat being allowed to reach the outer surface of the retort.

19. The recovery of the sensible heat of the coke, coupled with the absence of radiation losses from the retort, raises the thermal efficiency of the system to the maximum attainable.

20. The flexibility of operation of the system is such that, without alteration to the design of the retort, the system can be applied, under all conditions, to the treatment of all bituminous coal, whether coking or non-coking, and to all oil shales, lignites, and, generally, to all solid oil-yielding materials without exception.

21. Thanks to the introduction of additional cementing substance in the form of heavy oil from the process itself, the limit of density of the fuel obtainable from any given coking coal is not determined by its normal coking property.

22. By the process of blending coke powder with the charge in treatment, a fuel of high density is produced, and owing to the addition of oil to the blend a high percentage of coke powder can be incorporated.

23. Without involving the production of any surplus gas, a smokeless fuel in blocks of useful size only—without breeze—of good mechanical strength, of a density, calorific value, and flaming property approximating to those of the original coal, and therefore a satisfactory substitute for that coal, can be produced from any bituminous coal.

24. The presence of dust in the oil vapours and gases leaving the retort is precluded, incorporation of oil in the blend removing the cause of dust.

25. The oil obtained is a true primary oil, rich in the lighter fractions, free from dust and pitchy constituents, and, therefore, easy to treat by ordinary refining methods, by cracking or by hydrogenation.

Transference of heat to a charge of coal by the agitation method having proved to be the only practical method by which the products could be obtained which low-temperature carbonization must yield to achieve its object, the problem was to remove the shortcomings of and the mechanical difficulties inherent in the agitation method. Both the former and the latter have been removed by the radical measure of eliminating their causes.

SPIRAL GASHOLDERS

By S. M. MILBOURNE, A.M.I.Struct.E.

A brief treatise investigating from a mathematical standpoint, as far as possible, the main loads and stresses induced in the various members which constitute the spiral guided gasholder. The determination of the actual sections required safely to withstand these loads is then a matter of arithmetical computation and practical experience in design

(*Concluded from p.* 361.)

Stability of Inflated Lifts.

The condition of stability of each lift when the holder is inflated is of importance, and will now be considered. Fig. 20 illustrates in outline a four-lift gasholder in steel tank, having all lifts fully inflated. The wind load on each lift is shown acting on the right of the structure, while the assumed snow load (S) over half the crown is also indicated as acting downwards through its centre of gravity.

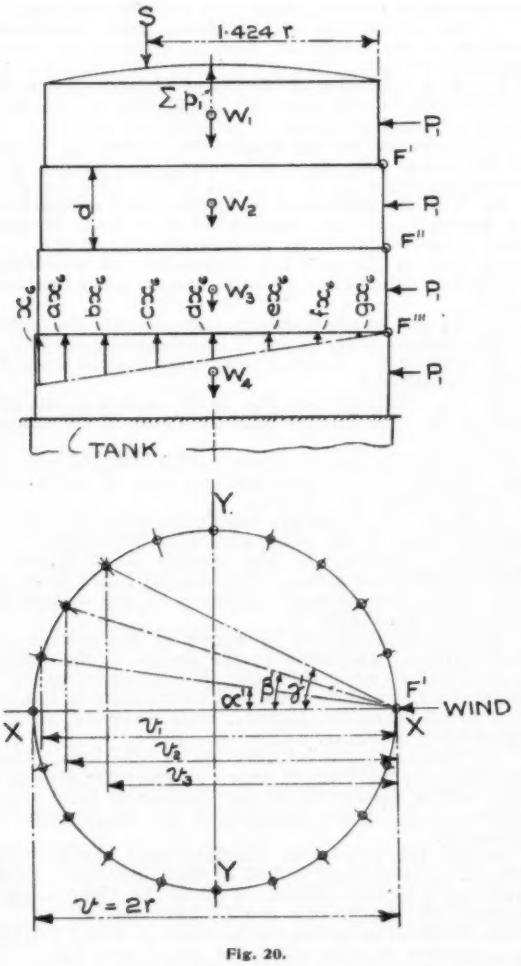

Fig. 20.

On examining the structure it will be seen that the wind and snow loads not only tend to overturn the inflated lifts collectively about the diametrical axis YY in the plane of the tank balcony, but tilting of the lifts relatively with one another is also induced. The point about which the inner or any subsequent lifts will tend to tilt will be that formed by the bearing of the cup plate on the dip channel, and will be situated on the axis XX on the windward side of the holder. Whether the lifts will tilt is dependent upon the magnitude of the anti-clockwise moments set up by the wind and snow and the counter moments due to the gas pressure. If W_1, W_2, W_3, &c., represent the weight of the inner and subsequent lifts, the total pressure of gas Σp_1) acting upwards under the centre of the crown will be

$$\Sigma p_1 = S + W_1 + W_2 + W_3 + W_4 + \quad . \quad . \quad . \quad . \quad . \quad (46)$$

For the inner lift to remain in stable equilibrium about the point F^1 the following condition of moments must obtain:

$$\frac{P_1 d}{2} + 1{\cdot}424rS + W_1 r \leq r(S + W_1 + W_2 + W_3 + W_4 + \quad . \quad . \quad .)$$

$$= \frac{P_1 d}{2r} + {\cdot}424S \leq W_2 + W_3 + W_4 + \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (47)$$

Similarly it may be shown that the conditional equation of moments about F^{11} governing the stability of the inner and second lifts in relation to the third and subsequent lifts is:

$$\frac{2P_1 d}{r} + {\cdot}424S \leq W_3 + W_4 + \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (48)$$

From this it will be observed that the outer lifts of large holders may not necessarily be in a state of relative equilibrium under gas pressure alone. Spiral holders having the usual proportions of depth to the diameter of the lift will generally be found to be in relative equilibrium under gas pressure only, but where the number of lifts exceeds four, it is possible that equilibrium of the fourth or subsequent lifts will require maintaining by the interaction of the guide rails on the rollers of the dip of the outer lift. To find the maximum load on the roller carriages on the dip of the hanging lift under these conditions, it is necessary to equate the excess of the overturning moment (M_x) to the resisting moments offered by the rollers. If the resistance of the rollers is assumed to be directly proportional to their perpendicular distances from the point F^{111} about which the lift tends to tilt, then the equation may be expressed in terms of the force system [x_6] as follows:

$$M_x = vx_6 + 2v_1 ax_6 + 2v_2 bx_6 + 2v_3 cx_6 + 2v_4 dx_6 + \quad (49)$$

where v, v_1, v_2, &c. = the perpendicular distances of the roller carriages to the point F^{111},
a, b, c, &c. = the proportionate fraction of the load x_6 resisted by each carriage.

Then by substituting values for a, b, c, &c., in terms of the perpendicular distances from point F^{111} and reducing, the following expression is obtained:

$$M_x = 2rx_6 + \frac{v_1^2 x_6}{r} + \frac{v_2^2 x_6}{r} + \frac{v_3 x_6}{r} + \frac{v_4^2 x_6}{r} + \quad . \quad (50)$$

Substituting the trigonometrical ratios for v_1, v_2, &c., in terms of r and the angles α^1, β^1, γ^1, &c., the following is obtained:

$$M_x = 2rx_6 + \frac{(2r\cos^2\alpha^1)^2 x_6}{r} + \frac{(2r\cos^2\beta^1)^2 x_6}{r} + \quad . \quad . \quad (51)$$

which reduces to

$$M_x = 4rx_6(\cdot 5 + \cos^4\alpha^1 + \cos^4\beta^1 + \cos^4\gamma^1 + \quad . \quad .)$$

Expressing this result in tangent form,

$$M_x = \frac{3n_3 rx_6}{4} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (52)$$

Therefore the maximum downward thrust (x_6) on the rollers is

$$x_6 = \frac{4M_x}{3n_3 r} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (53)$$

As the guide rails are fixed at an angle of 45° with the vertical, it may be shown that further force systems operating horizontally are induced in the dip ring of the hanging lift, in order to maintain equilibrium. It is scarcely necessary, however, to go further into this question, as the most important point to be considered is the resulting compressive load on the side framing of the lift. By substituting n_3, the number of vertical stays in the lift, for n_3 in equation (53) the maximum load on the vertical stays may be readily determined. In these circumstances it is preferable to design large gasholders of such proportions that all lifts are relatively stable under the action of internal gas pressure alone. The load on the cup rings will then be of a more uniform character while the maximum

degree of steadiness under working conditions is also achieved.

In cases where it is necessary to add weights to the inner lift of a holder in order to increase the gas pressure it will be seen that this may be done without interfering in any way with the relative stability of the lifts, as the weight of the inner lift (W_1) does not appear in the final equations of condition. The loading, however, must, of course, be symmetrical about the principal axes of the structure.

Load on Foundations.

The foundation for a spirally guided gasholder consists of an annular raft of reinforced concrete some 2 or 3 ft. greater in diameter than the tank. The thickness of the concrete and amount of reinforcement, however, is dependent upon the loading and nature of the ground on the site. The most unfavourable conditions of loading on the concrete foundation are usually realized when

(*a*) the holder is deflated and at rest in the tank,
(*b*) the holder is fully inflated.

Under the former condition, the weight of the tank side is taken as acting over the horizontal table of the bottom angle curb, while the weight of the lifts is supported on the rest blocks placed at equal distances round the inside of the tank. When the inner lift is at rest, it is usual to assume a snow load over the entire area of the crown equal to 2S in order to represent the most unfavourable conditions of dead load. If the crown of the inner lift is supported on a pier at the centre of the tank, a load equal to about one-third the weight of the crown framing, sheeting, and snow is brought on to the centre of the foundation, and due allowance must be made for this load when designing the foundation. It will also be seen that in addition to the weight of the structure and snow load there is the weight of water in the tank to be considered. The pressure of water (p_3) in tons per square inch on the tank bottom is given by the expression

$$p_3 = 10^{-4} \times 1{\cdot}94 d_2 \qquad (54)$$

where d_2 = depth of tank in feet.

When the holder is fully inflated, the rest blocks are relieved of the weight of the lifts, but the overturning moment due to wind pressure and the assumed weight of snow (S) on half the crown increases the load on the tank bottom curb on the leeward side of the structure. From this it follows that the relationship between the overturning moment on the holder and the maximum load per square inch on the foundation beneath the tank bottom curb may be expressed by the equation

$$M + m = Z p_4 \qquad (55)$$

where Z = the section modulus of the circular area under the bottom curb about the neutral axis YY,
p_4 = the maximum compressive stress per square inch on the foundation due to overturning moments only.

If E represents the width of the horizontal table of the bottom angle curb, then the approximate value of Z when E is very small compared to D is $Z = {\cdot}8D^2E$. Substituting this value in (55) and equating for p_4 the following is obtained:

$$p_4 = \frac{M + m}{{\cdot}8D^2E} = \frac{1{\cdot}25(M + m)}{D^2E} \qquad (56)$$

Now if p_5 = the compressive stress on the foundation beneath the bottom angle curb due to the dead weight of the tank sides, then the maximum compressive stress round the periphery of the tank under the most unfavourable conditions of loading will be equal to $p_3 + p_4 + p_5$.

On the windward side of the holder the overturning moment tends to lift the tank side, but since the weight of water acting downward on the tank bottom curb greatly exceeds this lifting force, no movement takes place.

PRESENTATIONS FOR FAITHFUL SERVICE

A pleasing ceremony was performed at the works of the British Gas Light Company, Ltd., Hull, on Feb. 2, when the Chairman and Managing Director of the Company, Mr. Henry Woodall, J.P., M.Inst.C.E., presented a Silver Tea Service to Mr. Alfred Smith in recognition of 50 years' faithful service with the Company. Presentations were also made to those who had completed 25 years in the Company's service, 17 employees receiving medals and certificates, including 3 officials who received Silver Cups in addition. Supporting the Chairman were Mr. Harold E. Copp, M.Inst.C.E., Engineer and Manager of the Hull Station, Mr. A. J. Mumford, Secretary to the Company, and Mr. G. S. Hatton, Accountant.

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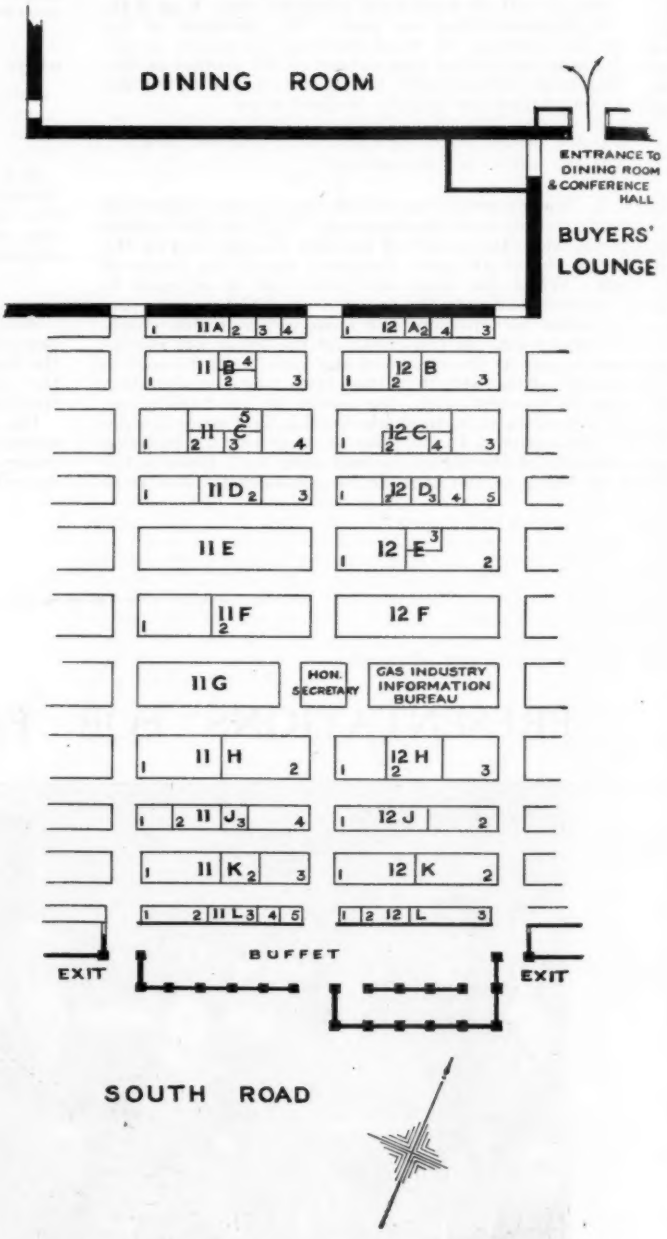


PLAN OF THE STANDS

WITH NAMES AND POSITIONS OF EXHIBITORS

Our Illustrated description of the exhibits at Castle Bromwich commences on the following page

Gas and Coke: Manufacture, Distribution, Utilization

A Display covering 41,000 sq.ft. at Castle Bromwich

An Illustrated Account of the Exhibits in the Gas Industries Section of the British Industries Fair

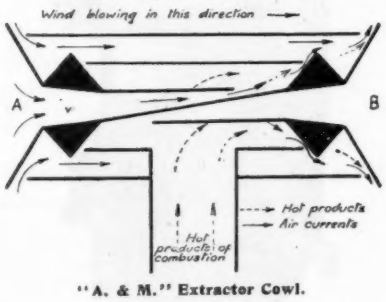
This Section is organized under the auspices of a National Committee fully representative of the various organizations in the Industry. The members of this National Committee are as follows: Chairman, Dr. E. W. Smith; Vice-Chairman, A. W. Smith. Representing the Society of British Gas Industries: H. E. Bennet, T. Alborn Clapham, Alderman G. Clark, Alexander Comley, E. J. Fox, W. J. Gardner, W. H. Handley, Leonard Hartley, John Orme, T. F. C. Potterton, H. M. Thornton, Douglas W. Turner, B. B. Waller, Frank West, Ernest West, Col. E. A. Wilson, Thos. O. Wilton, and A. L. Griffith. National Gas Council: W. J. Sandeman and L. E. Clift. Institution of Gas Engineers: Harold E. Copp, J. Herbert Canning, and W. E. Price. British Commercial Gas Association: Sir Francis Goodenough, H. Pooley, Mrs. M. A. Cloudesley Brereton, and J. C. Walker. Joint Gas Conference Committee: H. C. Smith. Birmingham Chamber of Commerce: E. W. Bache, C. E. Greener, C. Elliott, and H. Eyles. Hon. Secretary to Section: R. J. Rogers.

Alder & Mackay, Ltd.,
New Grange Works, Edinburgh.

This firm are exhibiting a representative selection of their consumers' meters, some having glass cases in order that their construction and operation may be observed. Attention is directed to their improved tin cased high-capacity meters and the dual-coin prepayment mechanism. They also show cast-iron cased high-capacity meters and a wet meter having a simple water compensating device for use in tropical countries.

Visitors have the opportunity of examining on this stand a cubic foot bottle similar to that used by the Standards Department of the Board of Trade in the re-verification of

The 100-C.Ft. Size Dry Demonstration Meter.



"A. & M." Extractor Cowl.

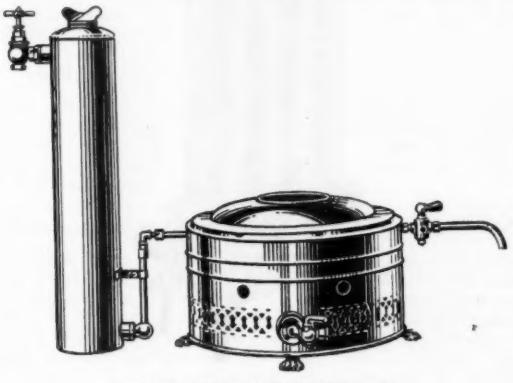
standard gas test holders, Messrs. Alder & Mackay being one of the few manufacturers of these extremely accurate measures in this country. To indicate their abilities in the manufacture of gas meter testing outfits, a miniature set is shown; this comprises a 5 c.ft. standard test holder, a 20-light standard wet test meter, a leakage meter, a testing table, and special absorption and capacity gauges. Dry test meters and a special dry demonstration meter (see illustration) with extra large dial for cookery demonstration and showroom use is also on view.

On the street lighting side they show their "Edinburgh" and "City" patterns square lanterns, fitted with the latest types of burners and stainless steel reflectors. They also show a complete range of clockwork and pressure-wave controllers for the various types of lanterns on the market.

In addition, the firm show a selection of their other specialties—pressure recorders, water column gauges, syphon and force pumps, &c.—while a comparatively new production worthy of special mention is the "A. & M." extractor cowl, which we illustrate. This is the invention of a distribution superintendent of long experience. The illustration shows the principle upon which this patented cowl is constructed, and it is claimed that it will definitely cure some of the most stubborn down-draught troubles.

Aquamellis Engineering Company,
Hounslow.

This firm are exhibiting the "Aquamellis Express" boiler and the "Aquamellis" water softener. The boiler, which is small and compact, is designed for small scale work (teamaking, sterilizing, &c.) and for heavy duty (baths, household hot water, &c.). It is claimed that no flue is required. In hard water districts the attachment



Boiler with Softener Attached.

of the water softener is recommended, which eliminates lime and ensures that the whole of the heat generated is used to heat the water as it passes through the return coil, and is not arrested by "fur" which would otherwise be deposited. The "Aquamellis" water softener, which is recommended in all instances where the water supply has a hardness of more than 8°, will soften 120 gallons of water from 16° hardness to zero between regenerations, entailing the use of 1 lb. of common salt.

Arden Hill & Co. (Radiation Ltd. Proprietors),
Birmingham.

The "Acme" "New World" gas cooker, made by Arden Hill & Co., is their latest contribution to de-luxe

cooking equipment. This example is in the new " Beau " enamel finish, with taps, &c., chromium plated, and is very attractive, quite apart from the well-known features of " New World " oven design which it incorporates.

Arden Hill's "Acme" "New World" Range.

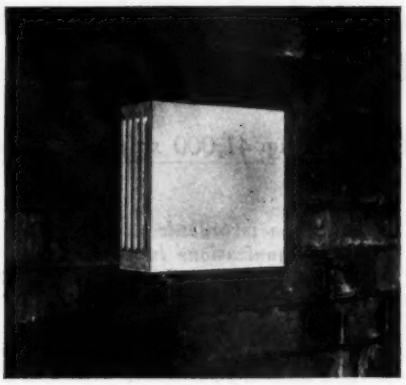
Arden Hill's Radiator (" St. George").

This firm also show the " Lancet " gas fire in armour-bright finish; and an interesting example of the " Sunhot " water heater in cream finish—this example being of the ball valve type. There is also a 20-gallon " Sun " boiler in cream finish, and one of their " St. Bernard " radiators finished in black.

Asbestos Cement Building Products, Ltd.,

Trafford Park, Manchester.

This firm are showing their well-known " Everite " flue fittings. These fittings never corrode and eliminate condensation. Among their new fittings are the " Roventa " cowl, for the prevention of downdraught, and the Ventile terminal (as illustrated), which enables a flue to be safely finished on the wall face instead of carrying the pipe above



Ventile Terminal.

the eaves. Their new gas fire stands and surrounds are attractive. An exhibit of pressure pipe for mains is also being shown which is a new development.

Autocontrol Boilers, Ltd.,

Victoria Station House, S.W. 1.

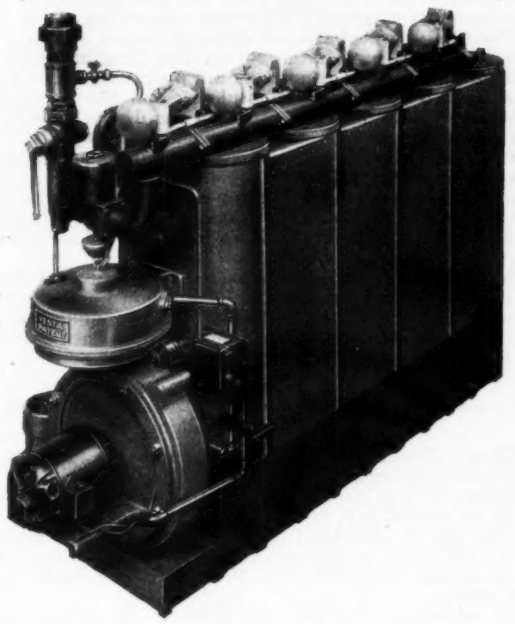
On this stand is to be seen the " Vesta " gas-fired boiler for central heating and hot water supply. This appliance embodies a new process of heat exchanging by employing radiant heat as the medium, the boiler being operated under fixed air and gas settings. Gas, with only sufficient air to support combustion, is heated prior to mixing and atomizing, then burned in a sealed furnace at a flame temperature of 2800° Fahr. in a refractory material. The resultant heat in the mass of refractory is radiated to the

" Vesta " U.1.

upper part of the boiler during gas combustion and during inactive intervals. The effective B.Th.U. thereby transmitted to the circulating water in central heating installations represents 90 p.ct. of the thermal value of the fuel;

and under test conditions 95 p.ct. is transmitted for domestic hot water supply.

By the application of thermostatic control waste and stand-by losses are prevented. When the required temperature for the system is obtained, the burner is automatically shut down. During periods of inaction, heating is effected by radiation from the refractory material. A pilot flame fires the main gas when the boiler is automatically started up.



Autocontrol "Vesta" U.5.

Obviously no storage space is required, and the actual floor space occupied by the "Vesta" gas-fired boiler is very small.

The "Vesta" boiler is manufactured in various sizes requiring capacities from 100,000 B.Th.U. to 2,000,000 B.Th.U. per hour.

Birmingham Gas Department.
Industrial Gas Development Section.

The City of Birmingham Gas Department has again arranged for its Industrial Gas Development Section to be represented at the British Industries Fair by the exhibition of town gas-fired furnaces and industrial apparatus.

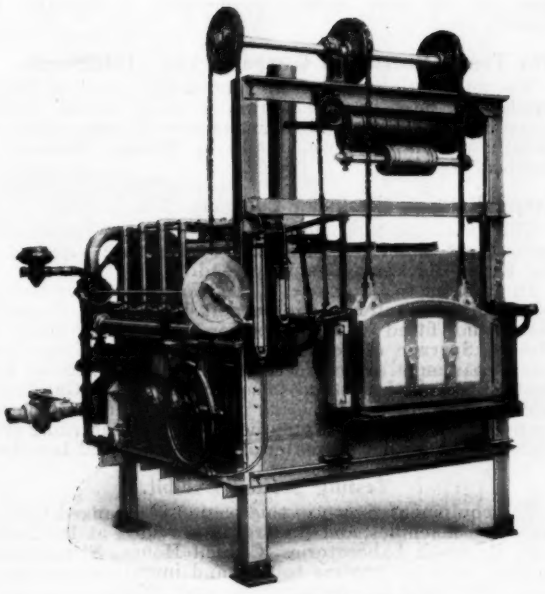
The exhibits have been arranged with the co-operation of various manufacturers of gas furnaces and industrial appliances, and will be shown under practical working conditions where possible, with heat treatment work actually being carried out. Where this is not possible, the furnaces will be shown just under fire.

The following is a brief description of the furnaces shown, each furnace being described under the name of the manufacturer:

Brayshaw Furnaces and Tools, Ltd., Manchester.

The "Novopress" furnace is representative of the above firm's products. This is fitted with a specially designed gas and air mixing valve fed with gas and air supplies under complete control. The furnace is of the recuperative type, the recuperators being made in heat-resisting metal.

To avoid losses usually attendant upon the opening and shutting of the furnace door, a special door and fore plate has been designed, which allows the fore plate to be taken below the level of the working hearth when the door is shut, the opening of the latter causing the fore plate to be lifted until the working hearth is reached, where it remains in position, leaving the door free to rise to the required height for entrance or extraction of work. The whole of this operation is carried out from a hand wheel at the front of the furnace.



Brayshaw "Novopress" Furnace.

This furnace is shown operating on actual heat-treatment work, and full-scale test figures of its performance will be available.

Davis Furnaces, Ltd., Luton.

With the lower prices for town gas which are now being offered to manufacturers taking gas in large quantities, the possibility of extending its use to forging operations is becoming more pronounced. With a view to fostering the demand, a forging furnace by the above firm is exhibited. This furnace embodies the principles now well-known in the Revergen type of furnace made by the Davis Company, in which regeneration of the waste heat is carried out by the change-over system.

The Incandescent Heat Company, Ltd., Birmingham.

The above firm is represented by one of their standard types of combination recuperative furnaces of a comparatively small size. This furnace is intended to be representative of the natural draught type of low-pressure gas-heated furnaces which are available for the general works heat-treatment operations of annealing, normalizing, carburizing, and re-heating. This furnace is fitted with automatic control of gas supplies and damper by Messrs. Foster Instrument Company.

Wm. Allday & Co., Ltd., Birmingham.

These are well-known makers of gas-heated soldering iron stoves, blow-pipes, &c., and are also makers of several interesting furnaces of smaller types. One of these is shown on the stand as being suitable for the heating of brass billets for hot stamping work.

The Metropolitan Fuel Company, Ltd., London.

This firm have been engaged for some time on experimental work with a view to producing a combustor which would be suitable for very much higher temperatures; and in what is termed their No. 3 Combustor (an example of which is shown working on a small furnace suitable for general hardening operations) they are convinced that they have a piece of apparatus which would be of great value in the application of gas to heating processes generally. The new combustor is of particular interest, and will be shown for the first time publicly.

British Furnaces, Ltd., Chesterfield.

A small furnace of the direct forge type is shown, representing the products of this Company, and embodies their now generally well-known method of surface combustion heating.

The Cambridge Scientific Instrument Company.

Complete indicating and recording pyrometer outfits made by this firm are shown with the Brayshaw oven furnace previously referred to. In addition, a Cambridge CO_2 indicator is shown connected to the waste-gas flue, and

also one of their surface pyrometers is available for general trial.

The Foster Instrument Company, Ltd., Letchworth.

The automatic temperature control apparatus on the incandescent heat furnace shown is made by the Foster Instrument Company. Other temperature measuring apparatus are also shown, made by Messrs. Negretti & Zambra.

James Keith & Blackman Company, Ltd.

The fans supplying the air to the various furnaces requiring air under pressure on the stand are supplied by the Keith Blackman Company, Ltd.

In addition to the above, a tank for bulk water heating is shown with suitable gas burners by Messrs. Rowell & Sons, and fitted with a Sperson thermostat made by Messrs. Sperryn & Co., Ltd. Further, the Birmingham Gas Department are co-operating with Messrs. Moler Products, Ltd., on their stand (also situated in the Gas Industries Section) in the provision of a gas furnace which has been specially built to show the advantages accruing from high-quality insulating material correctly joined together.

Testing Section Exhibit.

The equipment shown in this section is arranged to illustrate the machines and apparatus provided at the Industrial Research Laboratories, Council House, Birmingham, to deal with the routine testing and investigational problems submitted by Birmingham and Midland manufacturers.

The main piece of apparatus is a 5-ton Avery vertical universal testing machine of the single-lever type, electrically driven, and provided with tools for carrying out tension, compression, and bending tests. A Brinell hardness testing machine of the dead weight type, arranged for loads from 30 up to 3000 kilograms, is also shown. To carry out further metal hardness testing, an Avery direct-reading machine of the penetrator type is included. In connection with the pressing and drawing of metals, which is largely carried out in Birmingham, a Haas patent sheet-metal testing apparatus is provided.

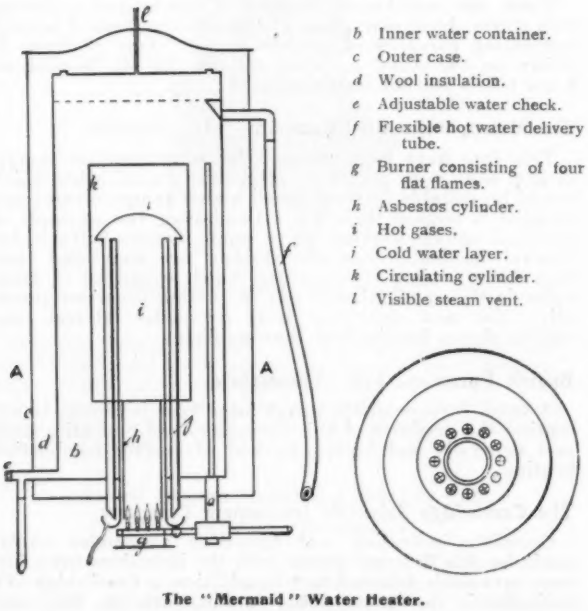
A machine for carrying out tensile tests with Portland cement briquettes is also included. This machine is of the shot-loaded type, with a cut-off device actuated by the breakage of the specimen. The shot passes into a receiving pan, which is weighed on the steelyard of the testing machine, thus making the machine self-contained.

All the above machines and apparatus will be demonstrated during the period of the Fair, and, as in previous years, arrangements will be made to test standholders' material exhibited at the Fair and during the period of the Fair, no charge being made for these tests.

T. G. Blood, Ltd.,

31-38, William Street North, Birmingham.

Here "Mermaid" economy heaters of the lagged boiler type are shown. One of the principal claims of this heater is the small amount of heat lost, resulting in an efficiency figure of 95 p.ct. The lagged boiler is made in three sizes —namely, 5, 10, and 15 gallon capacity, while a small 2-gallon heater is made on a similar principle, internally, but not externally, lagged. The principle adopted is as follows: The products of combustion are carried away into the twelve outer tubes (as shown in illustration), where heavy condensation is taking place, and are washed in this condensation, and so the majority of the sulphur fumes present are absorbed, resulting in the issuing waste being in the form of a weak solution of sulphuric acid, which is carried away into the waste pipe. All parts of the apparatus that come into contact with this acid are constructed from chemically pure lead. For hard water districts where corrosion is likely to take place the heating unit is made to take out, for periodical cleaning and scaling.



b Inner water container.
c Outer case.
d Wool insulation.
e Adjustable water check.
f Flexible hot water delivery tube.
g Burner consisting of four flat flames.
h Asbestos cylinder.
i Hot gases.
j Cold water layer.
k Circulating cylinder.
l Visible steam vent.

The "Mermaid" Water Heater.

The safety type balanced draught heater shown is for installation in any bathroom in any circumstances, no matter what outside conditions are prevailing. The heater is sealed to the inside atmosphere, and the principle of "balanced draught" is utilized in the design. The apparatus is complete with water-controlled gas valve.

The "Mermaid" wash-copper is exhibited, as also is a gas-heated towel rail, which consumes about ½ c.ft. per hour. It is provided with a draw-off tap to supply sufficient hot water for morning toilet, shaving, &c. It is supplied in a variety of different finishes to match colour schemes, &c.

A patent whistling kettle particularly designed for use on a gas stove is demonstrated. Also shown are lamps constructed of copper or tin suitable for public lighting, mounted on iron standards. They are fitted with enamelled or chromium plated reflectors.

J. & J. Braddock,

London and Oldham.

Messrs. Braddock are showing a full-size 12-in. station governor arranged for water loading or weights. The governor has sufficient seal to withstand pressures up to 20 in. of water, but can be arranged for still higher pressures; also on the stand is a patent retort house governor with new valve so constructed that high vacuum conditions do not adversely affect the desired conditions in the foul main.

In addition, the firm are showing their new patent setting controller, which has been specially designed to control the pressure or vacuum conditions required in the common offtake pipe of a setting of retorts, to enable the maximum yield of therms and calorific valve to be obtained, which may otherwise be affected by varying pressure or vacuum conditions. On this stand are exhibits of standard and high-capacity dry gas meters with new two-coin attachment and with seamless diaphragms; also glass case meters to show the internal construction, a wet meter with improved drum of ordinary type, and a new patent double drum wet meter, which will pass increased hourly quantities of gas with minimum loss of pressures. Another feature of this meter is that it allows a large amount of water to be evaporated for the 5 p.ct. range in registration. There are various forms of pressure gauges and high-class main cocks.

Geo. Bray & Co., Ltd.,

Leeds.

On this stand is a full range of Bray incandescent burners and mantles. The No. 790 D incandescent aluminium burner fitted with the Bray patented diffuser is prominently shown, accompanied by other patterns of the No. 790 series. These burners are fitted with a device which prevents lighting back and renders the burner practically noiseless in use. They continue to give good service and are greatly appreciated by gas engineers, and have been adopted as maintenance burners by many gas undertakings. These burners are also exhibited in chromium plated finish.

A wide range of incandescent burners is on view—inverted types, including one with a reversible arm for adapting to either upright or inverted fitting; swan neck types; upright burners, for which there is still a considerable demand; burners for bowl lighting, hall lamps, landings, &c. All Bray burners are made of the best materials, designed to maintain the highest efficiency, and tested under actual working conditions before leaving the factory.

To interest street lighting engineers a selection of well-made street lighting burners is on view. Although Bray flat flame burners are little used for lighting purposes, manufacturers of gas heating apparatus will be interested in the flat flame burners the firm make for this purpose.

Bromford Tube Company, Ltd.,

Birmingham.

Here are displayed hot-finished weldless steel tubes from ¾-in. to 15-in. bore. The exhibit includes boiler tubes,

steam pipes, loose-flanged tubing; the Carlton patent flexible pipe joint; Bromford patent tubular steel pit props; ships' derricks and davits; gas and water mains, &c. An exhibit of particular interest to lighting engineers and

Examples of Bromford Lighting Standards for all Purposes.

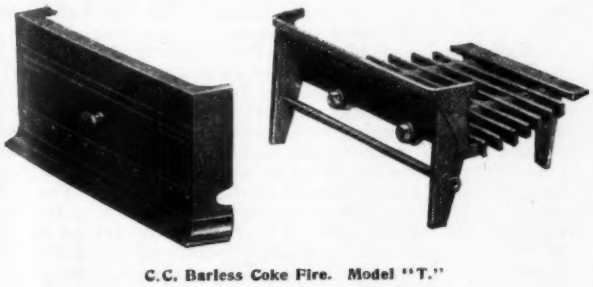
municipal authorities is the new range of Bromford lighting standards. This includes many new and distinctive designs which are very attractive in appearance. Bromford lighting standards are manufactured from special-quality seamless steel of high tensile strength, and are made for every gas and electric lighting requirement.

C. C. Fires, Ltd.,
London.

The firm are exhibiting C. C. alternative fires for gas and coke or any other solid fuel, and C. C. gas ignited coke fires. Considerable improvements have been made over the fires exhibited last year, in so far that one type of grate bottom (adjustable to any shape of fire opening) is supplied for either coke or coal. Previously, the firm supplied a different grate for coke from that for coal. Each C. C. fire installed is therefore a potential market for both gas and coke, and by this means the ardent coal fire enthusiast may be converted to the use of coke.

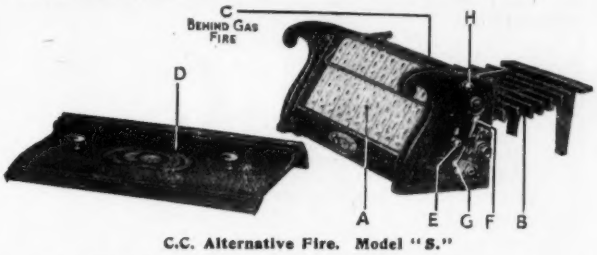
All fires are also now fitted with a luminous flame igniting burner, which will definitely ignite coke under normal pressure conditions in the short time of 12 minutes. In many cases, this period of ignition can be reduced to as low as 8 minutes.

The grate bottoms of all C. C. fires are flat and horizontal, and the flames from the luminous type burner are directed underneath the grate and around the firebrick sides, no effort being made to direct the flames between the bars into the coke. It should be appreciated that it is useless heating coke if the surrounding ironwork and firebrick is comparatively cold, since the heat will then be lost to the surroundings. Therefore, by making the grate bottom hot and the surrounding firebrick, the coke will quickly draw through. It is claimed that this type of burner has overcome many difficulties associated with the ignition of coke fires by gas.



C.C. Barless Coke Fire. Model "T."

The alternative fires for gas and coke, and the Model "T" coke fire can be installed in fireplaces having a hot water boiler at the back, without structural alteration to the existing boiler or supply system. The Model "T" Fire can be fitted to any shape of fire-opening without structural alteration.



C.C. Alternative Fire. Model "S."

A Inclined Gas Fire.
B Patent Grate Bottom.
C Gas Igniting Burner.
D Detachable Cover protecting gas fire when using open fire.
E Draught Control Shutters to open fire.
F Upper Tap on fire controls lighting burner.
G Lower Tap on fire controls gas fire.
H Gas Fire hinges up or may be easily removed by withdrawing pins (H) for clearing ashes.

To meet the case where a new fireback lining is required, the firm exhibit a new whole-piece fireback suitable for coke fires, which is designed to pass through the standard width of fireplace openings, thereby greatly minimizing the work entailed in fitting a new firebrick lining.

Cannon Iron Foundries, Ltd.,
Bilston.

On this stand is to be seen the new inclined gas fire, the principle of construction of which enables the sloping radiants to be set at the correct angle for uniformly heating the room with minimum gas consumption, and the exacting demands of modern hygiene are fully met by the effective ventilation which the design ensures. In addition to the best satin finish, a great demand is made for the art copper bronze and art silvo finishes, and the varied tastes of the discriminating are provided for in the art metal sheathed finishes in antique copper, antique brass, and antique pewter.

Cannon "Clematis" Gas Fire.

The "Vitaglo" radiant is now supplied with Cannon fires. These radiants are much brighter, and give a soft glow that reaches every corner of the room. The medical world is agreed that this type of radiant heat is more healthy than the dark rays of longer wave length. A softer warmth, without scorching, is always experienced when a fire is fitted with "Vitaglo" radiants.

The "New Challenge" gas cookers shown are thoroughly up-to-date, and embody all the modern points of practical construction. In the "Porceliron" mottle enamelled finishes, these cookers present an excellent appearance; the smooth, clean surface of the enamel is hard, durable, and very easy to clean. The "Autimo" oven heat controller is reliable, and takes charge of the food, giving relief to the busy housewife, who can use to advantage the time thus saved.

"Double Centenary" gas ranges in "Porceliron" mottle enamelled finish with white-tile enamelled exterior, sides, and door panels are on view. The ovens and hotplates are on one level, and the ovens are double cased and enamelled throughout.

The "Cambridge" gas cooker shown has a hotplate of an entirely new design, having burners drilled with radial holes in four sections, and combining the merits of both drilled ring and efficiency burner. The bars are specially

constructed to give pan stability. The oven, with a specially constructed bottom flue, ensures a high efficiency, prevents short circuiting, gives an even heat, and eliminates condensation.

Cannon "Cambridge" Cooker.

The "Belle" radiator exhibited is suitable for halls, corridors, shops, &c.

Robt. Cort & Son, Ltd.,

Reading.

This firm have a representative range of their specialities, giving an opportunity for engineers interested to have a "close up" which is not always possible when the appliances are installed in connection with a complete plant. The firm are showing one of their latest type—No. 15 series—of coke cutting machines, which, from its robust design, gives the impression that the right thought has been introduced to make it a "care-free" detail. As to efficiency, the results under actual working conditions speak convincingly.

A novel type of complete cutting, grading, and bagging plant demonstrated is just the outfit required in many works.

Screens of the rotary, reciprocating, and vibratory types are in evidence, the last mentioned being one of this firm's latest productions.

Other exhibits include Cort's patent anti-dip valve, improved main drilling and tapping apparatus, a wrought-iron pipe cutter "that will stand up to its job longer than the man using it," and a laboratory grinding mill "that eclipses the pestle and mortar."

A fine collection of photographs, &c., portraying other activities of the firm is also displayed.

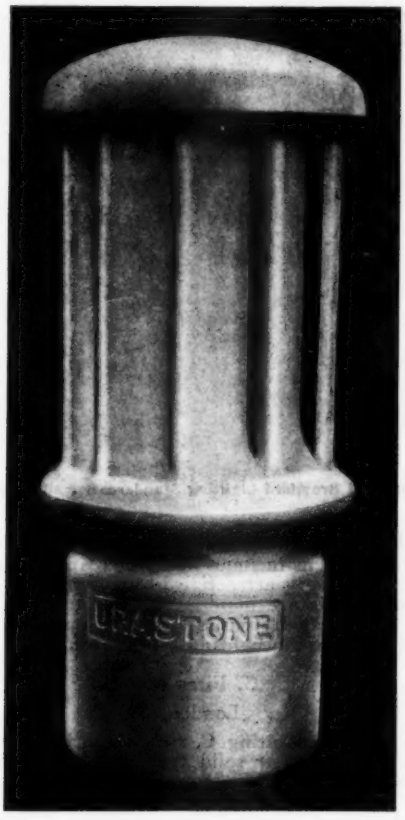
Cellactite and British Uralite, Ltd.,

296-302, High Holborn.

A special feature is made of "Urastone" pipes and fittings as supplied extensively to the Gas Industry, and of new types of baffler. The new G.L.C. louvred terminal is interesting, and specimens are exhibited on the stand.

Efficient flue practice requires in the cowl or terminal low resistance to the outward flow of products. Yet the cowl must be weather and bird proof, and possess minimum tendency to down blow. Protracted tests in severe service conditions confirm that these essentials are properly combined in this new design. Outward flow is unhampered; no more than three louvre apertures in the terminal can simultaneously be exposed to one wind direction; and, as our illustration shows, there is no access for birds.

Further, this terminal is neat, sightly, and strong, and is made of incorrosible "Urastone," the permanent condensation-proof material manufactured in an extensive range of pipes and fittings to satisfy all flue requirements.



G L.C. Terminal in "Urastone" for Vertical Vent Pipes.

"Uralite" and "Cellactite" are also shown. The latter is a roofing material made to meet modern conditions. It is a mineral compound furnished with a steel core, the steel being permanently sealed from all corrosive influences by chemically inert bitumen, and thickly coated on both sides with a bonded proofing of homogeneous asphalt-asbestos felt. "Uralite" is fireproof, a non-conductor of heat and electricity, vermin and rot proof, and does not warp, crack, shrink, or expand. It is light, easily handled, and easily fixed.

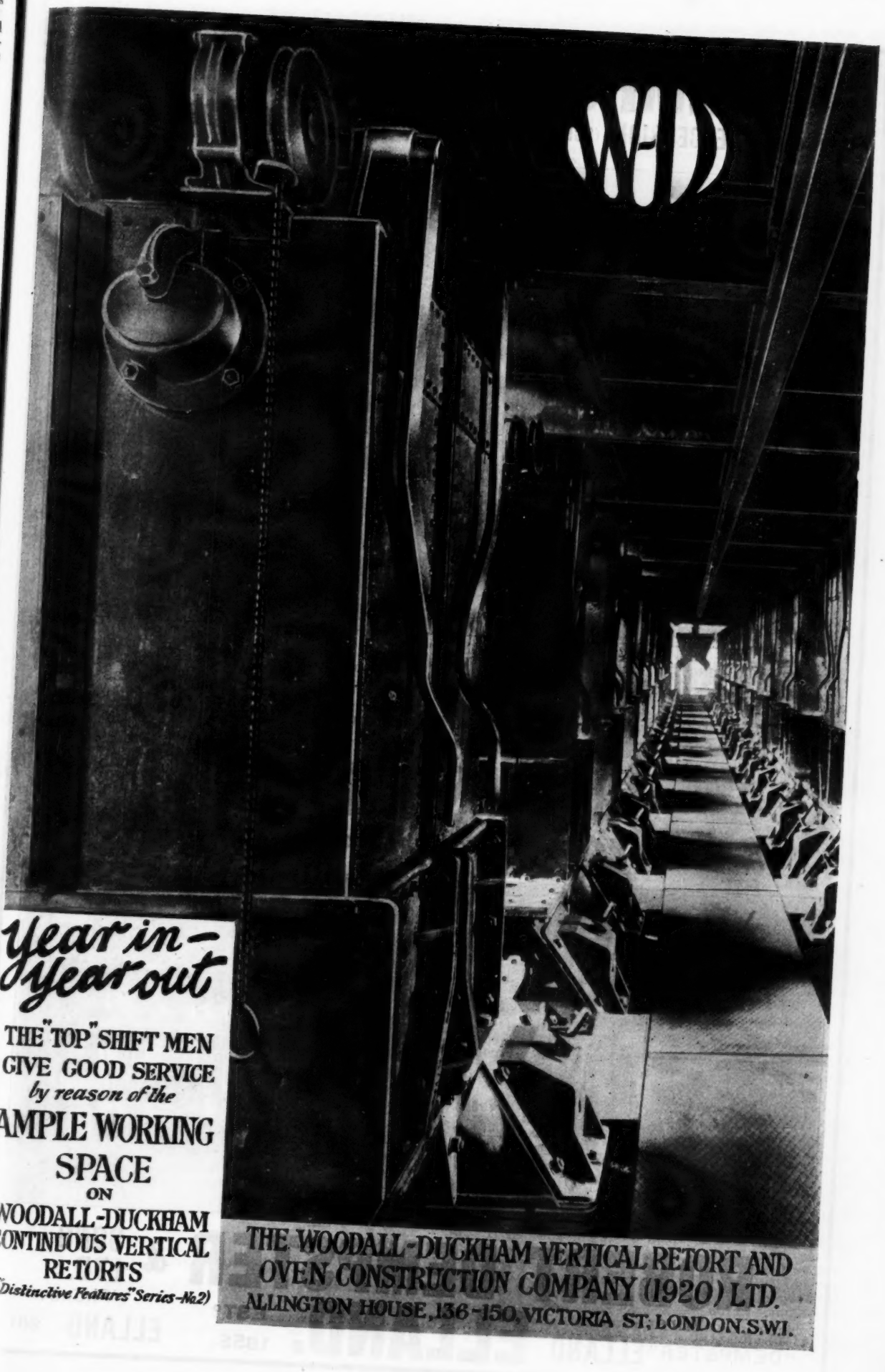
Asbestone cooker bases and backing are also on view.

W. & B. Cowan,

Incorporated in Parkinson & Cowan (Gas Meters), Ltd.,

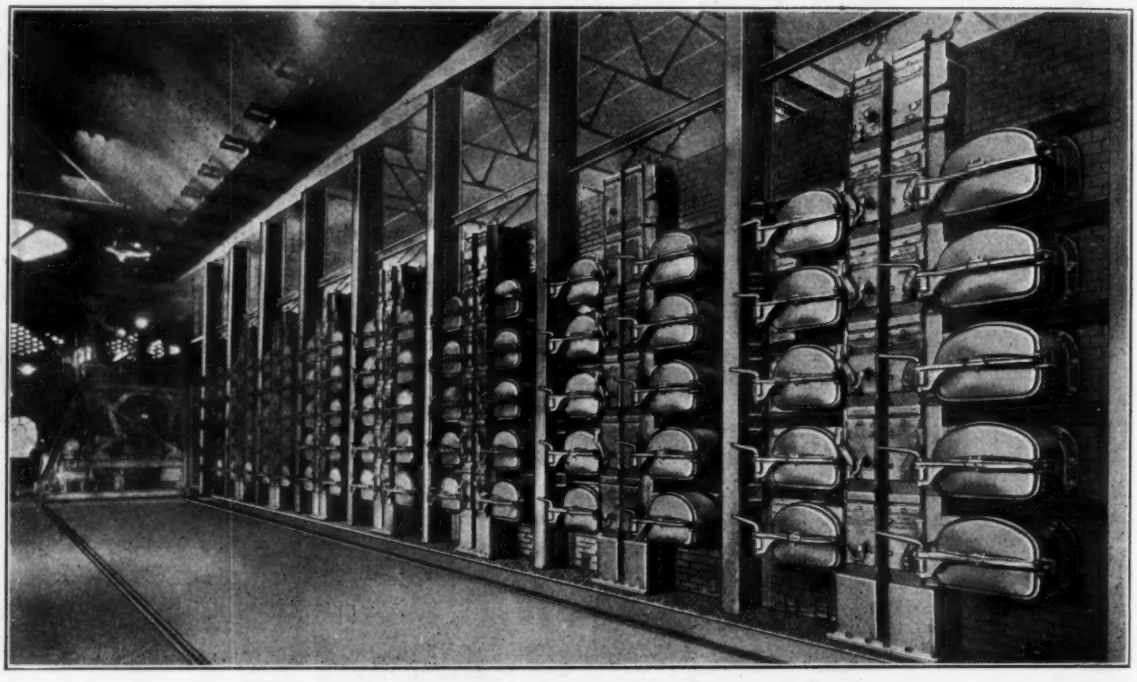
Fitzalan Street Works, Kennington Road, S.E. 11.

The exhibits of this firm are of unquestionable interest to gas and water engineers who may visit the Exhibition. One of the chief items of interest to gas engineers is a specially designed high-capacity ordinary dry meter in which the whole mechanism can be readily inspected. The meter has been manufactured for industrial purposes to meet heavy demands, and its robust construction will appeal to all engineers. Another exhibit is the new "Super-Two" prepayment mechanism which allows the consumer the option of using shillings or pence without any alteration or adjustment of the mechanism. The principle involved is a differential gear which permits the purchase of gas to the value of each coin, the return motion of the mechanism being obtained from a second differential gear attached to a scroll cam. This enables a large amount of gas—viz., 2300 c.ft.—to be prepaid before the mechanism reaches its limits. In addition to the above there are exhibits of the "Ferro" ordinary meters. A small model of their valve station meter and also a retort house governor fitted with the Brown & Holton patent distance control is on view.


W-D
Year in—
Year out
THE "TOP" SHIFT MEN
GIVE GOOD SERVICE
by reason of the
AMPLE WORKING
SPACE
ON
WOODALL-DUCKHAM
CONTINUOUS VERTICAL
RETORTS
("Distinctive Features" Series—No. 2)
THE WOODALL-DUCKHAM VERTICAL RETORT AND
OVEN CONSTRUCTION COMPANY (1920) LTD.
ALLINGTON HOUSE, 136-150, VICTORIA ST., LONDON, S.W.1.

"DEMPSTER-TOOGOOD"

LEVEL-GAUGE DESCENSION (SCRUBBER) OFFTAKE PIPES & FLAT BENCH-COVER



NO PIPE AUGERING, NO BRANCH CONNECTIONS.

GAS SCRUBBED BY COOLED ATOMIZED SPRAY OF VIRGIN LIQUOR.

NO TENDENCY FOR AIR TO BE DRAWN UP AS WITH (CHIMNEY EFFECT) HOT ASCENDING PIPES.

VALVE WASHED THROUGHOUT CARBONIZING PERIOD.

BENCH-TOP FREED OF ALL MOUNTINGS.

NO MAIN ARCHES, ECONOMIC, FLAT BENCH-COVER AUTOMATICALLY ABSORBS EXPANSION OF SILICA

PERIODIC

RE-CONSTRUCTION

THE ONLY-WAY TO MAINTAIN EFFICIENCY

ROBERT DEMPSTER & SONS LTD.

Wire: "DEMPSTER" ELLAND **ELLAND.** EST^{D} 1855. 'Phone: ELLAND 261

Davis Gas Stove Company, Ltd. (Radiation Ltd. Proprietors),

London and Luton.

Davis are showing a No. 166 gas range in the latest "Beau" finish, which bears the stamp of the individuality of the Company, and the workmanship leaves nothing to be desired. In addition, they show an example of their "Antony" fire in ebonite finish.

Davis' "Alpine" "New World" Range.

Davis' Nautilus Coke Boiler.

Particular interest will be centred on the geyser exhibit, which takes the form of a Davis "Shamrock" geyser of the latest pattern, and incorporates several new features, among them being absolute safety in operation, and extreme ease of dismantling for cleaning purposes.

As part of the Davis exhibit, one of the "Nautilus" coke boilers is shown, and also a No. 3 "Balance" radiator.

W. H. Dean & Son, Ltd.,

Victoria Works, Burnley.

On this stand there is a large variety of gas-heated washing coppers, including patterns with an outer casing of strong steel sheet, porcelain enamelled in a black and white mottled finish. These have the advantage of durability, and are easy to clean. A number of the boilers exhibited are fitted with a brass draw-off tap for emptying purposes, and each pattern can be supplied with or without this fitting. A wood cover is also supplied with some of this firm's boilers, which after use can be reversed to form a small table. Other exhibits are copper water heaters; counter urns for restaurants and canteens; rustless cast-iron pan boilers, especially recommended for butchers' use in brawn making, ham boiling, &c.; gas-heated washing machines; stove piping, corrugated elbows, ventilating caps, tee-pieces, and patent bafflers.

District Iron and Steel Company (1931), Ltd.,

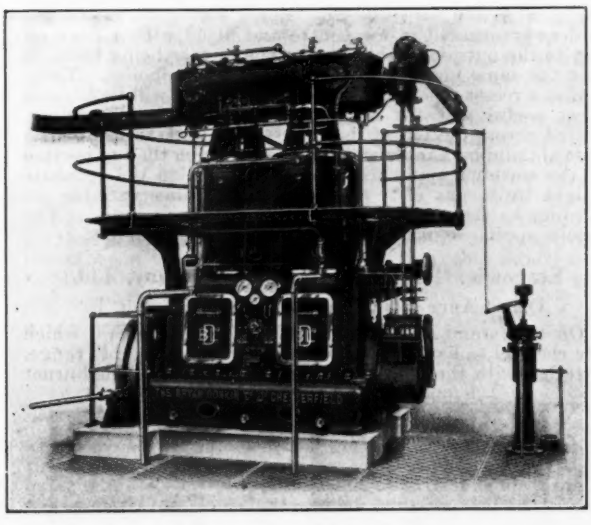
District Works, Smethwick.

This firm, who manufacture gas producers, are demonstrating their automatic feed, which distributes fuel uniformly over the fire bed. The feed can be fitted to ordinary static producers at small cost.

Bryan Donkin Company, Ltd.,

Chesterfield.

This Company are showing several photographs, among which are various examples of Rateau turbo-exhausting plants. The Company hold the licence for the manufacture of turbo-exhausters, compressors, boosters, and blowers, and have now supplied over 300 to gas-works, coke oven installations, &c. The firm are also makers of rotary exhausters for gas-works and many other industrial purposes. They have been making these for 75 years and have supplied them to all parts of the world, the total number being upwards of 7000. Models are exhibited on the stand of the two-blade and three-blade exhausters.



A Steam-Driven Duplex Vertical Reciprocating Gas Compressor,

Having enclosed frame, fitted with forced lubrication. Capacity 120,000 c.ft. of gas per hour, against gas pressures up to 30 lbs. with steam pressures up to 150 lbs. per sq. in. and running at 350 r.p.m. Supplied for the transmission of coke oven gas under high pressure.

Another specialty of the Company is gas valves, which they have been making over eighty years. Last year the sales reached a total of over 10,000 valves. Models are exhibited of high and medium pressure double-faced valves, the single-faced rack and pinion valve, and worm and rack valve, and also a disc valve for use with purifiers.

Special mention might be made of their high-pressure double-faced valves, one of which is shown with part of the body cut away to demonstrate the internal working of the valve. These valves are made to withstand pressures up to 100 lbs. per sq. in. They are so designed that the bonnet can be removed and a new nut or spindle fitted while the valve is under pressure.

A photograph is exhibited of a 48-in. diaphragm gas

governor at the Nechells Works of the City of Birmingham Gas Department. This is the largest of its kind in use in this country. There is also a photograph of an installation of special Reynolds high-pressure district governors at King's Norton, which are reducing the gas pressure from 15 lbs. per sq. in. to the normal supply pressure. A model of this type of governor is shown. There are photographs of other types of gas governors and regulators for district and service work.

The Company are among the pioneers of the high-pressure system of gas distribution in this country, having been makers of governors and regulators for 22 years. Their specialties include rotary and reciprocating gas compressors, pressure blowers for industrial purposes, and oil spraying plants to prevent naphthalene troubles. Their high-speed reciprocating compressors are particularly suitable for dealing with coke oven gas in connection with the Gas Grid Scheme. They are showing various types of gas-pressure regulators for gas services, meters, stoves, geysers, radiators, &c., an improved clean-easy type lubricator for gas exhausters and gas and air blowers, and an oil sprayer for the removal of naphthalene deposits in gas mains. The firm are now developing in this country a high-speed turbo-exhauster designed on the Rateau principle for speeds up to 10,000 r.p.m., and are showing a star type impeller for this type of machine.

Economic Gas Boiler Company, Ltd.,

Junction Mills, Burnley.

The Economic Gas Boiler Company, Ltd., are displaying a wider range of their gas wash-boilers than in previous years. Special attention is drawn to the variety now available in the grey mottled porcelain series. No. 13 pattern is one of the latest additions, having a galvanized corrugated casing and polished pressed aluminium top rim fitted with a circular copper or wooden lid.

Then they have a new washing machine—this being for the first time on view. The machine takes the form of gas boiler, washing machine, wringer, and table top complete. When closed the combination is a most useful kitchen table. The top is hinged to lift up; then the wringer, which is attached to the underside, is turned to the right ready for use. The copper pan—that is the gas boiler—is situated in the centre and fitted with a draw-off tap to the outside of the washer, the burner being fitted in just the same manner as the ordinary wash-boiler. There is also a recess on each side of the pan which will be found a most useful rest for the damp linen between handling. Fitted across the top of the tank—from back to front—is a cast aluminium handle which passes through the top portion of the washing appliance, which is placed to the requisite height by means of a peg, the height being variable according to the quantity of linen to be dealt with. The whole appliance is simple in construction and use.

Economic Household Appliance Company, Ltd.,

Queen Anne Road, Cassland Road, London, E.

On this stand are "Ekonomik" gas kitcheners, which are claimed to have all the advantages of a portable range, together with those of an ordinary gas cooker. One burner

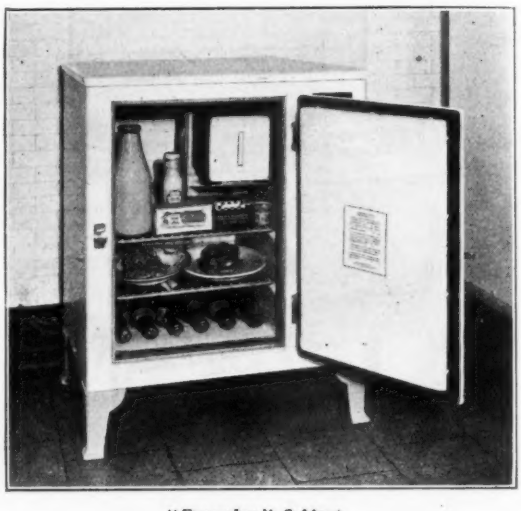
"Ekonomik" Gas Kitcheners.

only is used for baking, boiling, frying, grilling, and toasting, and a fire to heat the room when required. The burner, being entirely apart from the ovens, does not get corroded, and all parts are accessible for cleaning. The cooker is fitted with a smooth top hotplate, which allows for a maximum number of vessels to be kept boiling or simmering. The gas consumption is approximately 40 c.ft per hour. An auxiliary gas ring for separate use is provided with all models.

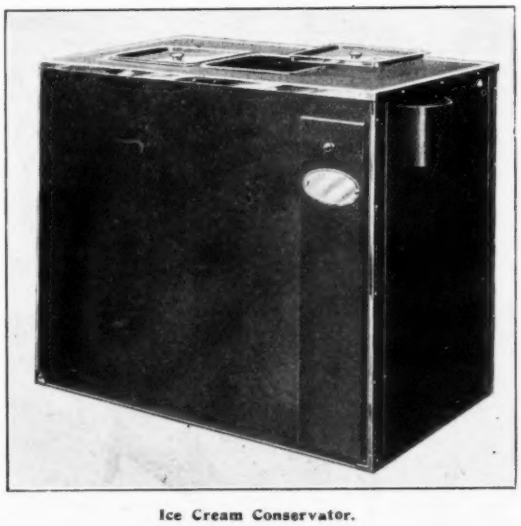
Electrolux, Ltd.,

Luton and London.

This firm are displaying a whole range of their gas-operated refrigerators. Among these are the new "Freezolux" cabinet, which makes refrigeration possible for the masses, in that it is the lowest-priced self-contained, automatic refrigerator made, and because it operates by means of a tiny gas flame.



"Freezolux" Cabinet.



Ice Cream Conservator.

Messrs. Electrolux are also showing ice cream conservators, operated by gas. These are of the same type as ordered so extensively by Messrs. J. Lyons & Co., who use 2200, and Messrs. T. Walls & Son, who use 320.

Emscote Foundry Company, Ltd.,

Warwick.

Emscote "Progress" gas cookers are shown on this stand. These cookers are of the vitreous enamelled type, packed and lined throughout, and fitted with stand and platerack, top plate, three burners, and a grill. A special feature in connection with this cooker is the system employed in oven heating by radiant heat. One burner is used in conjunction with a steel radiant. The oven is of the totally enclosed type. With this system of heating there are no open flames. A gas and oven control is fitted as standard. Oven gates, grids, &c., are finished in dull chromium plate.

Another appliance exhibited is the Emscote "Bunga-

low " cooker, designed for small households. It can be supplied in black or vitreous enamel finish, top plate fitted with two boiling burners and one grill.

The " K-B " portable gas heater shown is fitted with an indestructible steel radiant, and is capable of radiating great heat with a low gas consumption. A gas control is fitted as standard. The heater can be used for boiling purposes and the making of toast.

A large range of gas fires is being exhibited in many artistic finishes. The range includes 5, 6, 7, and 9 radiant fires, and some samples shown are fitted with " fender type dogs."

A special display is being made of six models of both open and inset types of coke fire. Special note should be taken of the gas burners, and the patented rocking firebars. The fires are supplied in both black and chromium finishes.

Sidney Flavel & Co., Ltd.,

Leamington.

In the attractive display of modern domestic gas appliances shown by this firm may be seen several new ideas.

The " Metro " coke fire, now well known, is shown in several new types. An inset fire is shown which will fit existing fireplaces without the use of special firebricks, thus saving bricklaying costs. A similar design is also on view, being self-contained with three special bricks held in position by a steel band, and this type also may be placed in position without special fixing arrangements.

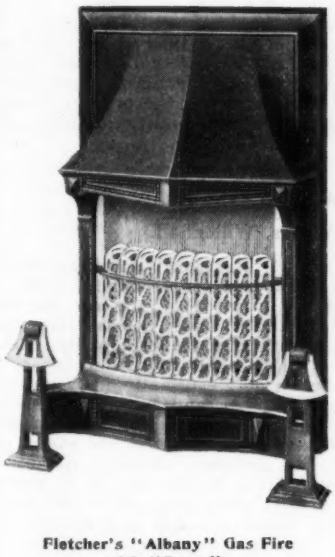
A new design of " Metro-Log " gas fire is made to fit ordinary coal fireplaces instead of the usual basket grate for the open hearth. It is anticipated that this type will meet with great success, since it will be available for use with all modern types of coal fire, and not be restricted to the large basket grate and open hearth.

The " Metro " dish warmer and a selection of Flavel gas cookers are shown.

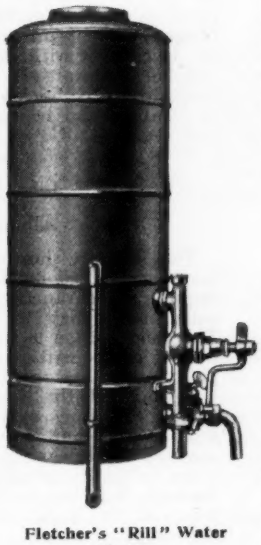
Fletcher, Russell & Co., Ltd. (Radiation Ltd. Proprietors),

Warrington.

Among the recent contributions to modern gas fire design must be included the Fletcher " Albany " with drop-pattern dogs, an example of which is shown finished in old gold art. This fire strikes an entirely new note, but at the same time incorporates the Radiation features which make for efficiency and hygiene.



Fletcher's "Albany" Gas Fire with "Dogs."



Fletcher's "Rill" Water Heater.

Further contributions to the stand by this firm are a " New World " cooker in the special Fletcher " Beau " enamel exterior finish, the colours of which are a delightful grey and cream, with taps and fittings chromium plated.

Fletcher's also exhibit a new water heater of considerable interest, entitled " The Rill." This heater is of an instantaneous type and is fitted with interlocking gas and water taps. The capacity is three-quarters of a gallon per minute at 42° rise of temperature from cold. This " Rill " water heater is attractive in appearance, and all the fittings are chromium-plated. Another small but useful feature is the water valve, which permits of adjustment to accommodate varying water pressures. The " Rill " heater is made to be fixed to the wall without a supporting shelf.

They also show a 3-loop " Embassy " radiator.

Foster Instrument Company,

Letchworth, Herts.

The above firm are exhibiting a complete range of pyrometers, electrical thermometers, and other instruments for the measurement and control of heat. Gas engineers will see on this stand a number of instruments being demonstrated which have been specially designed and produced for the Gas Industry. A new type of optical pyrometer embodying extreme accuracy with robustness and portability is exhibited; this is likely to appeal to gas-works managers as it can be conveniently carried round the works and used for " snap " readings. The instrument is of the " disappearing filament " type, great accuracy being obtained by use of the Wheatstone bridge. The movement is also of the " Resilia " vibration and shock-proof construction, an important point with instruments for industrial use.

In addition to exhibits on their own stand, a number of other manufacturers are using Foster automatic temperature controllers to regulate the temperature of their furnaces, both indicating and recording controllers being in use on gas-fired furnaces. The remarkable progress which has been made in gas-fired furnaces during the last year or two is, to a certain extent, due to the activities of scientific instrument makers, and gas engineers will find that once again the Industry is able to hold its own, especially on the point of economy and low fuel costs.

Foster & Pullen, Ltd.,

Avil Works, Crossley Hall, Bradford.

This firm are exhibiting selections from their extensive indoor and public lighting specialties, notably their " strip " lanterns in various styles and sizes, many of which figured prominently in floodlighting scenes in St. James's Park and throughout the country last summer. They also show two novelties in the shape of spot lamps, one of which makes specially prominent figures of policemen on point duty and the other of which with its upward as well as horizontal beam, being by way of a variation of their strip lantern, is applicable alike for the rendering prominent of point duty men as well as numerous other more extended purposes. Even more striking, in fact revolutionary, is a protected catalytic device shown on their stand for attaching to the controllers of street lanterns, doing away, it is claimed, with the whole system of by-passes, thereby effecting great economies. Indeed if all that is put forward for it can be substantiated, and the inventors of the device assert that it can, this should certainly prove one of the most striking features of the gas section of the Fair.

" Gas Journal " and " Gas Salesman,"

11, Bolt Court, Fleet Street, London, E.C. 4.

When in doubt, ask at stand 12 L 1. Mr. Blencowe, who is in charge, has over thirty years' service with Walter King, Ltd., and has been on the stand each year that they have exhibited at West Bromwich, so that he can answer a good many inquiries both about the Gas Industry and about the B.I.F. As throughout the 83 years of its existence, so at the Fair, " Service " is the motto of the " Gas Journal," and Walter King, Ltd., will be delighted to " shake a hand " with their very many friends.

The full range of current publications is on view, including, in addition to the " Journal " itself, the monthly " Gas Salesman "—now one of the Industry's accepted facts; the two annuals, the " Journal Calendar and Directory " and the " Gas Salesman's Pocket Book; " as well as Widlake's " Electricity on Gas-Works " and Seymour's " Assessment of Gas Undertakings "—both standard works in their own line. By the way, a supplement to the latter, which will bring it completely up to date, is now in the printers' hands, and will be on the stand before the end of the Exhibition.

General Gas Appliances, Ltd.,

Guide Bridge, Manchester.

This stand enables the various appliances manufactured by this firm to be shown to the best advantage. The general " Immersion " indirect water heater combination set is shown for the first time. It has been specially designed for housing schemes, no feed or storage tank being

required. The "Immersion" heater unit and thermal storage heaters are also exhibited, and can be seen working. Both single and double cased wall type water heaters are here—the latter of new design and construction. "Governor-General" gas cookers, with single-burner ovens, are exhibited in various sizes, and can be supplied either with tiled or willow-pattern exterior enamels. "Villa-General" gas cookers are representative of the cookers with two burner ovens.

General gas cookers are shown in a variety of enamel finishes, including the "Newart" blue and white self colour. This latter is a new finish for 1932, and includes chromium fittings and platerack grids.

The gas fire exhibit includes selections from the "High Peak" series in art metal, oak grained, art black, and pearl finishes. Attention is called to the new curved "Gen-ray" radiants which are now fitted as standard to all General "High Peak" Magna gas fires. Both steam and non-steam radiators are demonstrated.

Gibbons (Dudley), Ltd., and Gibbons Bros., Ltd.,

Dibdale Works, Dudley.

These firms have an office and reception room on their stand, where representative samples of well-known refractories manufactured by Gibbons (Dudley), Ltd., may be inspected. These include sillimanite, carborundum, silica, and highly aluminous bricks, blocks, and special shapes. The office is constructed with standard No. 1 grade firebricks, the windows being formed of silica segmental retort sections and silica combustion chamber blocks.

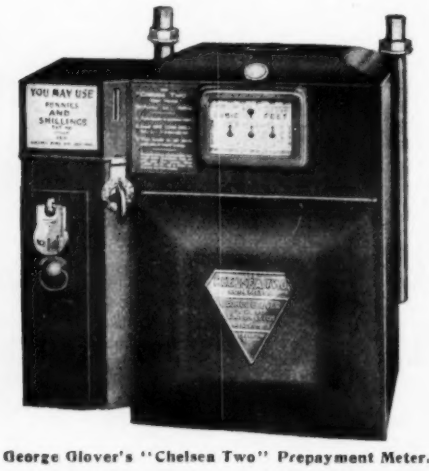
Messrs. Gibbons Bros., Ltd., exhibit drawings and photographs of horizontal and vertical retort settings and of Gibbons "Kogag" coke ovens. During 1931 they received a repeat order for 14 ovens from a large steel company in the North of England. These ovens have been erected and set to work and are giving complete satisfaction. Messrs. Gibbons Bros. make it their business to assist the Gas Industry in the sale of gas and coke. They have a large department designing and constructing furnaces and tunnel kilns which consume these fuels. Photos and drawings of tunnel kilns, carburizing, and heat treatment furnaces can be inspected at this stand.

It is interesting to note in this connection that the Dressler tunnel kilns erected in the past two years consume 10,000 tons of coke annually, and the gas consumed by kilns and furnaces erected in the same period amounts to 10 million c.ft. annually.

George Glover & Co., Ltd.,

Chelsea, London, S.W. 3.

On this stand a special feature is made of the new "Chelsea Two." The outstanding advantage of this new prepayment meter is that both pennies and shillings may be placed in the same slot and the corresponding volume of gas obtained without altering the meter in any way. Local conditions frequently require the fitting of penny meters in one part of a district and shilling meters in another. This has formerly entailed the carrying of stocks of both kinds—stocks sufficiently large to comply with the policy and to meet those frequent requests which are received from consumers who wish to change from one type of meter to another.



George Glover's "Chelsea Two" Prepayment Meter.

The "Chelsea Two" overcomes these difficulties once and for all. It reduces capital outlay, it cuts down storage room required, it eliminates the costs involved in the frequent change for meters of one-coin capacity. To this must be added the extra revenue which the "Chelsea Two" ensures. Every day the sale of thousands of cubic feet of gas is lost owing to the necessary coins not being available for meters with single-coin limitation. Shillings cannot always be afforded, specially towards the end of the week. Pennies can then be used at the convenience of the consumer, and this gas consumption (which otherwise may well be lost) brings extra revenue to the gas undertaking. The "Chelsea Two" is fitted with a simple price-changing attachment with a range from 2s. 2d. to 13s. 10d. per 1000 c.ft. Only one price-rate setting is necessary. When the meter is set for a penny it is also set for a shilling. There is a clear and legible rate indicator inside as well as outside the meter.

Messrs. George Glover's stand also makes a special display of their famous "Ranelagh" meter, and these two types—the "Chelsea Two" for pennies and shillings, and the single-coin "Ranelagh" (both of which are shown in "standard" and "high-capacity" sizes)—provide a choice which meets every requirement the prepayment meter suggests.

Thomas Glover & Co., Ltd.,

Edmonton, N. 18.

On this stand there is on view a selection of Thomas Glover dry gas-meters. Models of standard capacity and high-capacity, ordinary and prepayment meters are included in the exhibits, and have a high degree of quality and finish. The prepayment attachment in this firm's meters calls for comment. Excessive strains have been entirely obviated, and the mechanism works by the application of a minimum of pressure. This attachment can be supplied either in the single-coin type or the two-coin type, as preferred.

An insight into the manufacture of the gas meter is given by means of a film demonstration. The film illustrates a tour of the firm's head works at Edmonton, and the audience is given an opportunity of inspecting the ingenious machinery and interesting processes employed.

Grant & West, Ltd.,

17, South Street, E.C. 2.

This stand has a special display of jointing materials for the Gas Industry, including a show of "Selek" metal-to-metal jointing material in powder form. Irrespective of temperature or pressure or of the nature of the fluid or gas in contact with the joints, "Selek" will remain tight, and keep joints tight under the most exacting conditions. In addition to "Selek," there is shown the ordinary range of jointings, to be used where high-quality jointings are not required.

John Harper & Co., Ltd.,

Albion Works, Willenhall.

This firm are showing their "Beatrice" gas fires, which are designed to meet present-day requirements, both as regards appearance and the absence of crevices for the collection of dirt and dust, and to assist in easy cleaning. The construction is simple with the smallest possible number of component parts. Particular attention has been paid to the design of the burner, especially in regard to the shape of the mixing chamber and venturi or choke tube. The burner is fitted with gunmetal teats, made from a solid bar, which have long life, and are easily removable for cleaning. The injector, which is patented, gives triple disintegrating action to the gas as it passes through into the burner, thus producing entire incandescence of the radiants for silent burning and economical consumption of gas. A further improvement on some of the fires is a new type of injector, where a single screw provides both adjustment for local pressure and calorific value. The reversible flue outlet fitted to "Beatrice" fires is more than adequate to carry away the products of combustion, thus rendering the fire perfectly healthy and a sound means of ventilation. "Beatrice-Sunglow" radiants have all the constituents for healthy heat efficiency, together with a bright appearance quickly obtained when lighted. The finishes are art black and vitreous enamels in various colours; they are indistinguishable from porcelain, and can easily be kept clean by wiping with a damp cloth.

The "Beatrice" gas cooker is also exhibited. It is made in two sizes; the simple effective construction of the oven with its cellular asbestos packing retains a cooking temperature with the minimum consumption of gas. Special

efforts have been made to keep the design simple, thus rendering cleaning very easy. The flue outlet has been redesigned and made detachable for cleaning. Two cookers are shown with a novel feature in the shape of what is known as the "Beatrice" Thermo Dial, which is a thermometer in the door of the oven, around which is fitted a dial giving the names of the usual varieties of food cooked in a gas oven, and the finger will stay where required by a slight manipulation of the oven tap, maintaining the temperature required.

Harper's "Beatrice" Cooker Door with Thermometer Fixed.

The "Beatrice" gas radiators, also shown, are constructed of cast-iron top and base, and steel tubes. Baffle plates are fitted in the top of each tube to prevent rapid dissipation of heat. This radiator is fitted with white flame Bray burners instead of the bunsen type, and is, therefore, free from any "lighting back" or adjustment troubles.

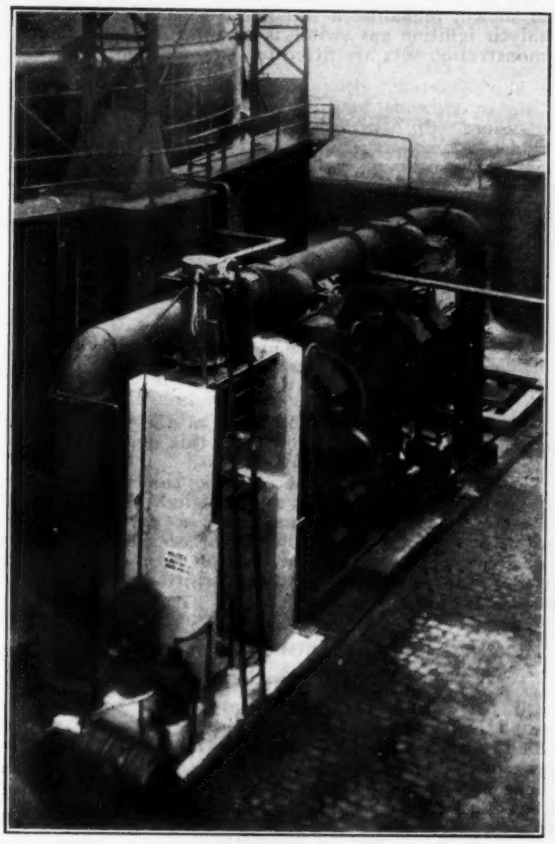
W. C. Holmes & Co., Ltd.,

Huddersfield.

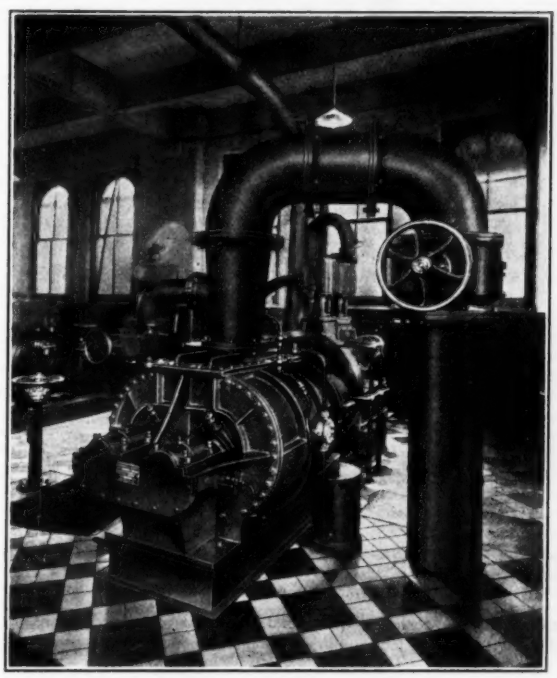
The Holmes stand, besides showing full sized examples of Holmes-Connersville exhausters (one of these on the stand being on order for the Dudley & Brierley Hill Gas Company), gas meters, and blowers, draws the attention of the Gas Industry to the advantages of their latest form of "Dri-Gas" plant, in which are combined in the one installation gas dehydration, naphthalene extraction, and continuous naphthalene and benzole recovery. Drawings and photographs of this latest invention are exhibited, together with statistics showing that with such a plant the operations of gas drying and naphthalene removal can be carried out not merely free of cost, but as a very profitable extension to a gas undertaking's revenue producing activities.

The oil regeneration unit may be added to any existing form of naphthalene washing apparatus. Apart from several installations of the new combined plant described and shown in the accompanying photograph, Messrs. Holmes have already built or have in course of construction several of these plants for naphthalene and benzole extraction on works where previously the wash-oil has been disposed of in water gas plants or by sale to tar distillers, &c.

A number of interesting models of individual pieces of gas apparatus manufactured by W. C. Holmes & Co. are also exhibited. One of the most interesting is that of the new industrial consumers' meter known as the "B.M." gas meter. This meter is specially suitable for capacities



Combined Gas Drying and Naphthalene and Benzole Extraction Installation by Holmes & Co.



Holmes-Connersville Exhauster Installed in a London Gas-Works.

of from 700 c.ft. per hour upwards and complies with the provisions of the Sales of Gas Act with regard to stamping.

Horstmann Gear Company, Ltd.,

Newbridge Works, Bath.

This display is based on "Newbridge" controllers and the "Newbridge" gas switch. All types of controllers

are shown, including the latest development of catalytic ignition gas controllers which dispenses with the by-pass.

New improvements in the "Newbridge" gas switch are also shown, including a tumbler type hand control. The catalytic ignition gas switch is now in full production, and demonstration sets are fitted for examination.

New Tumbler Hand Control used in conjunction with the "Newbridge" Gas Switch.

In addition, production samples of the "Newbridge" service governor are on view, and this new departure in governor practice is of great interest.

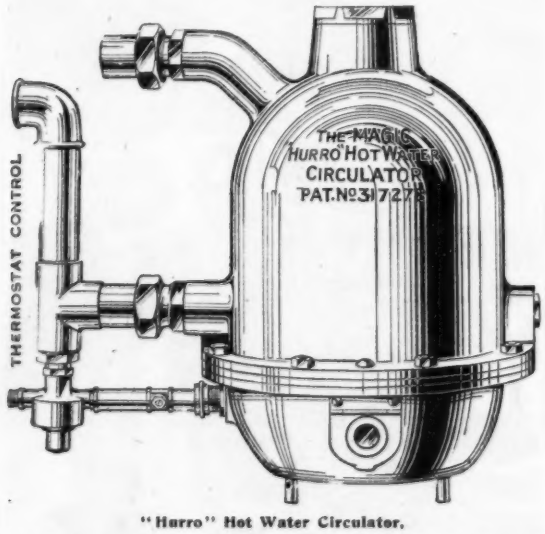
The stand itself is attractive, one side being designed as a lounge with the latest types of lighting fittings, and "Newbridge" switches, including a catalytic ignition switch fitted to a gas fire. The other side of the stand represents a street, and two lamps with controllers are fitted. The centre of the stand is fitted with two large demonstration rooms.

"Hurry" Water Heater Company,

Birmingham.

On this stand are demonstrated the "Hurro" gas-heated water circulator and the dual purpose gas copper which provides hot water to the bath on the overflow method.

The uses to which the "Hurro" circulator (illustrated here) can be put are many. It can be used in conjunction with the back boiler to a coal fire for the purpose of maintaining the heat of the water in the hot water storage tank during winter nights, and in the summer months it will supply the required hot water when it is not desired to have a coal fire burning. It will also supply abundance of hot water for all domestic purposes by itself without any back boiler being fitted.



"Hurro" Hot Water Circulator.

Made of cast non-corrosive white metal to withstand 200 lbs. pressure. It is fitted with six Bray jets, and thus does not necessitate extra service pipes.

It can also be advantageously used for the purpose of heating the water and maintaining the temperature in any system of hot water radiators, and no quantity of water is too great to be dealt with in this manner by the "battery" system of installation. The advantages in the case of the heating of public buildings, factories, workshops, &c., include low cost of installation, and the fact that no labour is required to attend to the apparatus or to remove refuse. For central heating purposes large sizes can be supplied if desired.

Gas Industry Information Bureau.

Visitors to the Gas Industries Section are able to obtain information on the use of gas in home and industry from a central information bureau. This bureau has been provided by the British Commercial Gas Association and members of the Society of British Gas Industries.

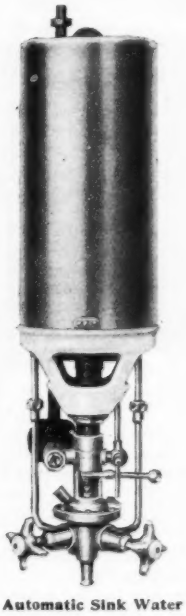
A number of salesmen, each a specialist, are on duty to assist visitors. A set of photographs on the bureau enables visitors to get a rapid survey of the manifold applications of gas, and the provision of seats for the public enables them to discuss domestic and industrial problems with the salesmen in comfort.

Ice creams are supplied to visitors to the bureau. The ices are supplied from gas-operated refrigerators and ice cream conservators. Another effective exhibit on the bureau is a cascade of steaming hot water which illustrates the application of gas to water heating.

Junkers & Co. (Great Britain), Ltd.,

(Sole distributors, Cookers and Geysers, Ltd., 244, High Holborn, London, W.C. 1.)

On this stand is an all-gas equipped model kitchen, in which gas operated appliances—cooker, refrigerator, incinerator, washing machine, linen drying cabinet, iron, &c.—are shown working.



"Ascot" Automatic Sink Water Heater.

A special feature is the "Ascot" automatic sink water heater. This water heater is a novelty which does away with the cold and hot water taps over the sink, and delivers hot water instantaneously, and in unlimited quantities up to 175° Fahr. Other types of "Ascot" water heaters are also shown in operation.

George Kent, Ltd.,

Luton.

This firm are showing examples of their most recent production in meters and control apparatus, covering the needs of almost every branch of industry in fuel metering.

For central stations and other plants when there is a considerable boiler plant the boiler panel displayed on this stand is most attractive. A variety of meters—all required for the proper running of a boiler—are grouped together in a symmetrical way. Among the panel meters are the combustion efficiency meter, which maintains good and even firing conditions; flow meters for determining the rate of steaming the feed make-up and the rate of feed; temperature recorders and indicators; pressure recorders and indicators; and multi-point draught gauge. All the meters are fitted flush with the panel, and are provided with concealed lighting arrangements.

A further range of steam meters is exhibited covering the needs of almost any industry. Particularly interesting is the small "Shunt" steam meter which enables the smaller mains of about 2 in. diameter to be metered economically.

An example of the range of the Kent Venturi meter is shown. This meter, which has been made and developed by George Kent, Ltd., for over forty years, is ideal for the

measurement of large trunk supplies, sewage, boiler feed, condensate—in fact, water under practically any condition.

Gas meters are represented by several products, all of special interest to the Gas Industry. A new design of "Shunt" gas meter is exhibited. This has been particularly evolved for use where the gas is dirty. Several patented features have been incorporated which render the meter capable of accurate measurement under the most severe conditions.

The balanced recorder is exhibited. This meter records the flow of gas on any pipeline, and is invaluable for controlling gas production. It requires very little pressure-drop for its operation. A newer model of this recorder is also shown; it is of particular interest where it is desired to alter the range of the meter easily.

The curved tube manometer gives indications of the rate of flow of gas in a pipeline. It is invaluable for test and control work.

Other meters for water, air, gas, steam, oil, &c., are shown, embracing the needs of almost every industry.

Lighting Trades, Ltd., and the Welsbach Light Company, Ltd.,

30-31, Farringdon Street, E.C. 4.

On this stand is an excellent display of incandescent gas mantles, modern gas lighting fittings, burners for domestic and street lighting work, and gas fires, including the "Kernscreen" model. Experience has proved that a working exhibit is a source of attraction to visitors, and a working demonstration of the most important processes in the manufacture of gas mantles, including the knitting of ramie yarn, ring tying and pleating, sewing and burning off and shaping, is a prominent feature of the exhibit. Finished specimens of the various types of mantles made by Lighting Trades and Welsbach are on view.

The "Kernscreen" Fire.

The fittings display embodies a number of panel glass pendants and brackets and an attractive range of glass and silk shades. A gas fire, which is being shown for the first time, is the "Kernscreen." This comprises a metal screen measuring 25 in. high by 20¼ in. wide with a double hinge door, behind which is fitted a 5-tube "Kern" fire with a semi-circular reflector at the back. The "Kernscreen" can be supplied in either hammered pewter or hammered oxidized copper finish, and is an attractive piece of hearth furniture as well as an efficient and reliable heater.

Donald Macpherson & Co., Ltd.,

Knott Mill, Manchester.

Over the last few years considerable time has been devoted to the study of special paints for waterless gasholders. Valuable research work has been done in conjunction with leading engineers and holder makers on this new problem. Several model gasholders are shown by this Company, indicative of the results achieved and a number of large-scale steel panels are exhibited with varied colour schemes, suitable for waterless gasholders.

Of interest to stove, grate, and range manufacturers are various types of modern and æsthetic art finishes for all classes of heating and cooking apparatus. These finishes are designed with a view to saving of labour in grinding and glazing of metal components, simplicity of application, and high output.

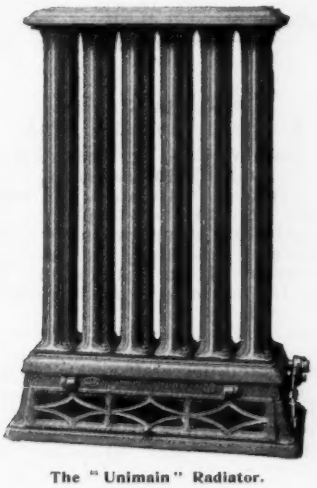
The remainder of the exhibit is both enterprising and practical. The office in the centre of the stand takes the form of a Chinese pagoda, piquantly characterizing the firm's brand name "Foochow," and showing in an interesting way the results obtained with the well-known decorators' materials bearing that name—"Foochow" enamels, flat oil paints, water paints, varnishes, &c. Incidentally, "Foochow" products have been selected for painting large sections of the Fair Buildings both interior and exterior.

R. & A. Main, Ltd.,

London and Falkirk.

Prominently featured on this stand is the "Deluxe Mainamel" cooker, an appliance that helps to make home cooking a real pleasure. This cooker has all-enamelled surfaces, which are as easily cleaned as the finest china, and is fitted with hot-stamped taps of stainless finish, with bakelite handles. The "Conservor" oven is a gas saver and bakes on every shelf, and the cooker can also be fitted with the red dial "Mainstat" device which automatically controls the oven heat, and enables the correct cooking conditions to be repeated time and again with certainty. While the "Deluxe Mainamel" is perhaps the *pièce-de-résistance* of the cooker section, there are also to be seen other examples of high-grade gas cookers which worthily uphold the prestige of the firm.

Examples of the firm's heavy cooking apparatus for hotel and restaurant use are also shown.



The "Unimain" Radiator.

Many and varied are the designs and finishes of the gas fires on view, which include specimens of both inset and other types, and also portable models.

The radiator section is interesting. Here can be seen the "Unimain," which has proved popular for use in offices and public buildings, and which ensures a thoroughly efficient and comfortable heating system. Its governor burners prevent variation in pressure from affecting consumption, and its automatic control of the heat output eliminates over-drying of the air. This radiator can be dismantled for cleaning or overhaul without disconnecting the gas supply. The "Cinemain" radiator for cinemas, &c., embodies the features of the "Unimain," but has a fixed front instead of a hinged door, which prevents any unauthorized person interfering with the burner or internal parts of the radiator base. A departure from the usual type of radiator can be seen in the "Roman" panel heater, which fixes on the wall, and is particularly adapted for halls, garages, &c., where floor space is restricted.

Meltham Silica Fire Brick Company, Ltd.,

Meltham, Huddersfield.

This firm are showing representative samples of their "highly converted" silica bricks and special shapes, such as are largely used in the Gas and Coke Oven Industries, and they display in an attractive form small built-up sections of vertical and horizontal retort and coke oven bricks. A new feature of the display consists of several whole-piece sections of silica horizontal retorts, and will supply a long-felt want throughout the whole of the Gas Industry.

Among Constructional Engineers whose shapes are shown

are the following: The Woodall-Duckham Company, Ltd., London; Simon-Carves, Ltd., Stockport; Drakes, Ltd., Halifax; and Robert Dempster & Sons, Ltd., Elland.

On the stand are also varied samples of super-refractories such as magnesite, chrome, and sillimanite bricks and blocks, &c., as manufactured by their allied concern, Messrs. Pickford, Holland, & Co., Ltd., of Sheffield.

Metropolitan Gas Meters, Ltd.,

Hyson Green, Nottingham.

Specially interesting on this stand is the "Metro-Duplex" meter, which can be set to receive either pennies or shillings, and be changed almost instantly from one to the other. Only four movements are needed when the gear cover is removed.

The valve opens, without the aid of a spring, to the full capacity of the meter when the first coin is inserted, and it is impossible to close the money box unless the change-plate is properly locked.

All-brass mechanism, and gears machine-cut from solid blanks are standard features of the range of meters on view.

Midland Brass Fittings Company,

181, Aston Road, Birmingham.

These manufacturers of gas fittings follow their usual custom of introducing several new patents. There is a meter filter which, fitted to the inlet of a meter, prevents foreign matter entering from the mains and leaving a deposit on the valve. There is also an ordinary inverted burner which the firm claim to be perfectly silent under sharp variations of pressure, and a little guillotine for cutting flexible tube, which is extremely effective and quite cheap. The firm's products of gas cocks and gas fittings of every description are well displayed, making this a comprehensive stand for those interested in the distribution of gas.

Moler Products, Ltd.,

42, Kingsway, London, W.C. 2.

This firm again have their technical staff at the exhibit, and they will be available to discuss in detail various applications of "Fosalsil" insulation. In order that these applications may be more easily explained, there is a gas-fired furnace operating at approximately 1000° C. This furnace is completely insulated, and, in spite of the high internal temperature of the plant, thanks to the insulation close examination may be made without any inconvenience whatsoever.

Since last year's Fair, the firm have considerably improved all their standard products, and also have greatly developed the possibilities of "Fosalsil" insulating concrete. They are exhibiting their full range of standard products, which includes "Fosalsil" solid grade bricks, "Fosalsil" economite bricks, slabs, &c., as well as various aggregates for concrete, and "Fosalsil" powder in its various forms.

New Geysers, Ltd.,

25 and 27, Addington Square, S.E. 5.

A full range of geysers and storage heaters is exhibited at the stand of New Geysers (1931), Ltd., a special point being made of white porcelain enamelled geysers. The "White Chief" geyser is a high-grade machine fitted with separate outer steel case, white porcelain enamelled, and patented sliding pattern "Access" base, improved interlocking fittings (or automatic valve where necessary), &c., in chromium plate, giving the whole a very pleasing appearance.

To meet the demand for a geyser of this type at a lower price, they have recently introduced the "White Ensign." This also has the separate outer steel case white porcelain enamelled, but with specially designed base, interlocking taps, &c., in bronzed finish, although these latter parts can be supplied in chromium plate if desired.

Other exhibits include the "Mite" lavatory geyser, which can be supplied in white porcelain enamel and chromium plate, and the "Two-Way" geyser, non-automatic, for supplying two points only—scullery sink and bath—is suitable for the small house or flat, in addition to the "Reliafont," which is a high-grade geyser suitable for high and low water pressures, usually fitted in kitchen or scullery. It will provide an unlimited supply of hot water to any number of taps.

P.B. Sillimanite Company, Ltd.,

791, Salisbury House, E.C. 2.

This Company are showing a large range of high-grade refractories as in former years. It will be specially noted this time, however, what immense progress has been made in bonding the material, the costing process now being adopted in many cases. The Company have now attained a degree of great efficiency in turning out special bricks to exact size and shape.

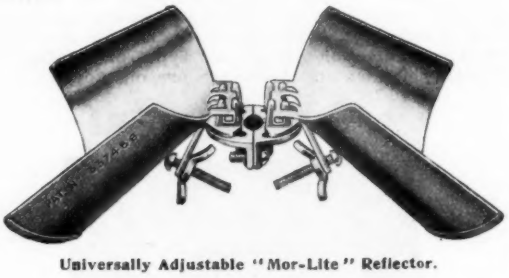
W. Parkinson & Co.,

Bell Barn Road Works, Birmingham.

This exhibit includes a comprehensive range of gas meters, ordinary and prepayment patterns; high-capacity dry meters; and experimental test meters designed for great accuracy. Models of large wet meters, both cylindrical and rectangular, are also exhibited. The "Bi-Coin" prepayment meter is of the optional type, designed to take two coins at will, without any change of mechanism. The model on view is arranged to take a penny or a shilling.

In governing apparatus this firm is showing, in addition to the models of the ordinary station governor, an actual governor tank adapted for pressure loading, together with pilot governor, used to load the main governor. This pilot governor can be fixed at a distance from the main governor, and the convenience of this system of regulating the pressure on a district is obvious.

The street lighting exhibits are also of considerable interest. The firm are showing a selection of square, suspension, and "U" fixing lamps, with mantles arranged in cluster and alignment formation; also a variety of conversion burners, wrought-iron swan neck fittings, column extension pieces, &c.



Universally Adjustable "Mor-Lite" Reflector.

The "Mor-lite" patent directional reflector calls for special comment. This is a simple and inexpensive device which can be adapted to any burners, and it is claimed that a 2-light medium burner with a polar curve averaging 150 c.p., will, when fitted with the "Mor-lite" give in the desired direction a value of 350 c.p. Furthermore, the increased illumination can be directed at the low angles of 10°-20°.

The "U.A." Clip.

The "Mor-lite" reflector comprises two highly polished "Staybrite" steel wings, which are secured to the burner by means of an attachment or clip. This enables the wings to be adjusted around both the horizontal and vertical axes, ensuring the maximum effect from the reflector, the adjustment being variable according to the height and spacing of lamps and the curvature of the road. The wings can be instantly detached when required, for the purpose of cleaning lamp panes, &c., and replaced in the same positions without disturbing the adjustment.

Another attractive exhibit on this stand is the "Beacon" lamp for island lighting. This is provided with an amber globe attached to a short ornamental column, and has been

specially designed to meet Board of Trade requirements. Other designs of " Danger " lamps are also shown.

Floodlighting by gas is demonstrated on this stand. Messrs. Parkinson are showing their " Flood-lite " lamp. This is a cylindrical pattern, with single burner. The lamp is so arranged that the beam of light can be projected at any angle. The lamps exhibited are of the suspension type, but can also be supplied with upright fixing, and collar for securing to lamp column. They are also showing a rectangular lamp—the " Line-o-Lite "—with " Staybrite " steel convex reflector at the back; this is fitted with twelve No. 2 mantles.

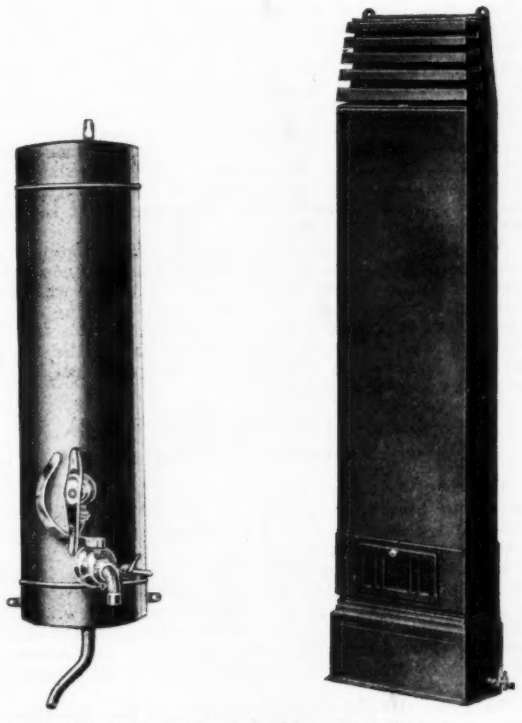
The " Beasley " recording gas calorimeter is shown, complete with pressure and temperature correcting mechanism and automatic waterlining tanks. This instrument, while requiring a minimum of attention, gives a record of the calorific value in B.Th.U. per c.ft. corrected to normal temperature and pressure, irrespective of variations in barometric pressure or in the temperature or density of the gas.

There are a large number of other exhibits on view, including pressure gauges in great variety, both of the double tube and single tube patterns; main thermometers, vaporizers, force pumps, &c.

Parkinson Stove Company, Ltd.,

Stechford, Birmingham.

This display comprises cookers, fires, radiators, and water heating appliances of the latest types and finishes. Cookers figure prominently in the exhibit, and include the " New Suburbia," with one burner bottom flue oven and automatic oven heat control. There are also examples of the B Series of cookers, in which oven ventilation depends on syphonic action, the gases passing upwards through the oven, and down a flue at the back. Other cookers, of the top flue type, include " Suburbia " and " Liverpool," the recently introduced " Newpark," and the " Stechford "—a cooker in miniature—is also shown. All these cookers



Parkinson's "Pearl" Geyser and "Indusa" Heater.

are attractively finished in mottled and self-colour enamels.

In the heating section are shown typical Parkinson gas fires in sheathed metal, bronze, and art silver finishes. Parkinson luminous radiators are featured, and the Parkinson " Indusa " heater is prominently displayed. The " Indusa " heater, a recent development, is a convection heater of special design arranged for permanent mounting against the wall, into which must be fitted an air-brick to allow the ingress of fresh air to the heater. The current of air induced by the burners is warmed, and delivered into the room, at the rate of about 1000 c.ft. per hour. The burners are governed, and light is diffused through a luminous door panel in the casing, adding an extra appearance of warmth. The inflow of air can be controlled by means of an air damper. The " Indusa " heater, finished to tone with any indoor decoration, is useful for heating large rooms, entrance halls, corridors, &c. Its approximate heating capacity is 1000 c.ft. upwards per hour.

Another important branch of the Parkinson Stove Company—that devoted to the manufacture of water heating appliances—is represented by the firm's " Treasure " and " Pearl " geysers, gacylettes, &c., the Parkinson storage heater, and similar apparatus. A notable addition to their apparatus is a new pattern " Pearl " geyser, for the supply of hot water to sinks and lavatories. This is a rapid and efficient heater of the chamber heating type. It is cylindrical in shape, strongly constructed in sheet copper, tinned inside, and is fitted with interlocking taps, which prevent the gas from being ignited before the water is turned on. The position of the taps and swinging spout can be adjusted to suit any special requirement, and the fixing by means of wall screws is a simple matter. The new geyser heats one gallon of water 40°, or 3 quarts 60°, in a minute, and has an approximate gas consumption of 60 c.ft. per hour. It is attractively finished in polished copper, Florentine bronze, or chromium plate.

The No. 52 cooker is fitted with two oven burners, and incorporates the siphon flue principle. Attention is directed to the rounded corners of the oven interior and to the enamelled wrought-iron swinging gates and sliding grids, which features allow of easy cleaning. The door of this cooker has a cam action latch of special design, and no browning shelf is necessary. A complete dinner of several courses can be cooked together at the same time. Finished in high-grade porcelain enamel, it can be supplied with or without " Ajusto " oven heat control.

An inclined curved fire is a new departure in design, and has a special curved concave radiant in place of the usual straight fuel fitted in a vertical or inclined position or the convex fuel. In the new fire, the flame is inclined backwards, and naturally follows the upward curve of the radiant. While sufficient warmth is directed to the floor to ensure foot comfort, a uniform distribution of heat throughout the room is obtained. The fire can be supplied as an inset type or frame type. The fender can either be of plain pattern or fitted with dogs.

Two Parkinson fires, the " Meriden " and " Hagley," also make their first appearance at the Fair. These fires, of the vertical radiant type, have curved fronts, and embody all the latest improvements in gas fire design. The new fires are obtainable in all the standard finishes as well as in new coloured duo-tone finishes.

A new pattern of the " Improved Treasure " geyser in chromite finish is shown. This incorporates a detachable interior and swing-round body, usual in this type of machine; it can be fitted with either interlocking gas and water taps, or safety gas valve, as required.

Radiation Ltd.

Shown as a combined exhibit of Radiation Ltd. are two examples of the " Cobble " " Beam " gas fire. This was recently introduced after a sustained period of intensive research work undertaken in the direction of improving the quality of the emission from the domestic gas fire. It will be noticed at once, from the two examples on the stand, that it is of an entirely new construction. The columnar radiant has been eliminated, and the result, so far as appearance is concerned, is to give a gas fire of natural and pleasing appearance. The warmth from the fire is noticeably " softer " owing to the high proportion of short infra-red energy emitted. In consequence of this, the penetrancy of the warmth through the skin is increased. Another very important point about the " Cobble " " Beam " gas fire is that its burner is of an entirely new design. This burner, after adjustment in accordance with the maker's instructions, is absolutely silent in operation. Finally, it will be noticed that the distribution of heat is improved as a result of the configuration of the radiating mass of the fire.

Two examples of the " Era " " New World " cooker are also shown, and this is the most recently produced of the " New World " family, designed to give the working man an opportunity of obtaining the very latest modern and efficient gas cooker with automatic oven-heat control, at a price well within his reach.

The Regent Heating Company,

Bradley, Bilston.

This Company are showing to the Industry for the first time a new patent automatic lighter for incandescent lighting. This, they claim, is suitable for any form of gas lighting. The Company are also displaying a special line of 5, 6, and 7 radiant fires for simple hire and hire purchase.

Richmonds Gas Stove Company, Ltd. (Radiation Ltd. Proprietors),

London and Warrington.

In view of the outstanding success associated with the "Equator" and "Newlyn" thermal storage water heaters, both are shown fitted and in operation. Since last year's Fair the "Equator" has been improved in some minor details, and is now available in both 12 and 25 gallon capacity sizes. The special advantage of the "Equator" is the speed with which it works. This heater delivers small quantities of hot water, for general domestic use, to any part of the house within 10 minutes of lighting the gas. The gas required to provide this initial hot water service varies from 8 to 16 c.ft. according to size of heater installed.

With the full gas supply of 55 c.ft. per hour (27,500 B.Th.U.), the 12-gallon "Equator" will supply sufficient water for a hot bath in 40 minutes starting from cold, after which it will continue to provide for an additional hot bath about every thirty minutes, for as long as required. With the 25-gallon "Equator" sufficient hot water may be drawn off for as many as three to four baths every hour.

Richmonds "Equator" Storage Water Heater.

Richmonds "Newlyn" Heater.

The thermostat shuts down to a consumption of less than 2 c.ft. of gas per hour under the small "Equator" and not more than 4 c.ft. per hour under the larger size. These gas consumptions maintain the high temperature of the water (about 140° Fahr.) until required.

The "Equator" which is on exhibition is in a cream cellulose enamelled finish, but these appliances are also available in an equally attractive black and gold "lustre" finish.

Richmonds "Newlyn" thermal storage water heater is for providing hot water at the scullery, sink, or wash basin, and well-merited prominence is given to this heater. Insulated and thermostatically controlled, it is a development of Richmonds "Lyn," and it is a thoroughly well-thought-out job, practical not only from the users' point of view, but from the maintenance standpoint also. Every possible facility is provided for easy cleaning and accurate adjustment at every point. In its cream cellulose enamelled finish and with chromium-plated fittings, the "Newlyn" looks most attractive.

No "New World" cooker exhibit would be complete without a "Bungalow" of that series, and Richmonds are showing a large size (No. B88DE) model in their new blue and white enamelled finish and complete with their special "Twin-Rack" plate rack. This cooker stands as a representative of the whole "family" of "Bungalow" "New World" cookers.

Richmonds "Lustre" finished gas fires are represented by the "Charterhouse," which is shown in "Black and Copper" finish.

Rowell, J., & Son,

Thermecon Works, Newcastle-on-Tyne.

On this stand will be seen a selection of the firm's gas-heated washing machines.

Sawyer & Purves,

Miles Platting, Manchester.

Exhibited on this stand are consumers' meters in glass and tinplate cases, also various sizes of meters and meter parts. This firm's prepayment meter with two-coin attachment is shown, as is also their patent diaphragm. This diaphragm, which is now widely used, has a covering of oiled silk, enabling the leather to retain the lubricating oils, preventing the "drying-up" of the leather, and prolonging the life of the diaphragm. A model coin collecting van is shown which, it is claimed, is a boon to slot meter collectors. Pressure gauges, main taps, and brasswork of all kinds made by the firm are demonstrated, as is also a model test holder.

Sigma Instrument Company,

Letchworth.

This firm are showing the following features in connection with their instruments: A new specific gravity recorder operated by the buoyancy of a 6 ft. column of gas which moves a hinged bell against a spring to drive the pen mechanism. Correction for temperature and pressure is made by holding the length of one of the levers in the magnifying mechanism. This is done by an enclosed volume of air, the expansion of which effects the change. They are also exhibiting a new relay valve which can be attached to the top of the recorder for use in connection with automatic control of calorific value, whether the control be by change of vacuum in the retort or by mixing with a low calorific value gas. The valve rotates on pivots, but is kept slightly clear of the stationary face containing the gas passages. By this means friction is avoided. In use, the relay valve is connected to a gas supply on one side and to the inlet of the exhauster on the other, and the relay valve connects an operated bell to one side or the other as the calorific value changes. All the gas used by the relay is passed back into the gas main at the inlet of the exhauster.

Also exhibited is an electric switch on the spindle of the calorimeter, for use in effecting automatic control at a distance or for lighting lamps to indicate whether the calorific value is above or below a desired value. In addition, there is a new B.Th.U. indicator with a fan-shaped dial and with mechanism similar to that of the Sigma recorder. The dial on this indicator is very large, and it can be read easily at a distance.

Stanton Ironworks Company, Ltd.,

Stanton, near Nottingham.

This firm are exhibiting their new Stanton-Wilson self-adjusting pipe joint which was placed on the market in 1930, and is now used with great success in pipes forming gas, water, and sewerage mains.

Excessive vibration due to present-day road traffic, and the troubles caused by ground subsidence, called for an improved type of joint for cast-iron mains. The Stanton-Wilson self-adjusting pipe joint withstands the effects of ground subsidence and traffic vibration, and solves many of the problems which have been troubling engineers for years past.

They are also showing four lengths of Stanton-De-Lavaud spun-iron pipe. Soon after the war the Company laid down at Stanton a plant for the mass production of iron pipe for the conveyance of gas, water, and sewerage. This plant has been twice extended, and has the distinction of being the first of its kind in the world. The latest development is the Stanton-DeLavaud spun-iron pipe made in 6-yard lengths—somewhat of an achievement when it is realized that this is an exceptional length for a cast-iron pipe.

The stand is paved with Stanton cast-iron road sections. On a concrete foundation these sections form a permanent non-skid roadway. The surface of this cast-iron road is not liable to develop pot-holes, nor can it disintegrate, and it cannot become rough and uneven due to the battering effect of modern traffic; and it forms a cheaper road than the granite sett road.

The Stourbridge Refractories Company, Ltd.,

Shut End Works, Pensnett.

This firm are exhibiting all classes of refractory insulating and boiler bricks and blocks, together with high grade cements for various purposes.

Stoves, Ltd.,

Rainhill, Liverpool.

This firm are showing a range of gas cookers, gas fires, and other domestic gas appliances, the mottled enamelled cookers presenting a neat and attractive appearance. The "Bakerloo" high-grade cookers are fitted with the "Autokook" oven heat regulator, by means of which a complete meal can be cooked without attention. The "Bakerloo" has many other labour saving features built into it.

The "Newhome," a cooker for the average family, is on strong legs which raise it well above the floor level. It is finished in mottled enamel. The "New Reliable" cooker is designed to meet the needs of the small family and for use where space is a consideration. It is obtainable in both black and mottled enamelled finish.

"Silo" gas fires with "Briteray-Silo" radiants are shown. These fires are finished in oxidized silver, copper, and brass, also oak and mahogany in addition to art black. "Argyll" hotplates, "Glide" gas irons, and "P.C.," "High Efficiency," and "Popular" gas rings complete an interesting exhibit.

William Sugg & Co., Ltd.,

Ranelagh Works, Westminster, S.W. 1.

A great deal of research and experimental work is carried out by Messrs. Sugg, and the Fair provides an excellent channel through which to demonstrate the findings.

The battle between gas and electricity for public lighting has been very much to the fore during the past year, and the case for gas has been strengthened materially by the

"Rochester" Upright Lantern with "Multi-Ray" Reflector.

big developments in reflection. A comprehensive collection of both the rustless-steel directional reflectors and the cheaper—though by no means less effective—silvered-glass "Multi-Ray" type is on view, together with statistical information showing the remarkable improvement in illuminating power which they effect. Broadly speaking, these reflectors are cunningly devised to collect the light rays which would normally be wasted and re-direct them along the useful path; so successfully is this achieved that in many cases the candlepower at the low angles is increased over 100 p.ct. Both patterns of reflector are now available for all types of street lamp, square or circular, upright or suspension, but it is only recently that the "Multi-Ray" has been adapted to the "Rochester" lamp. As will be seen from the illustrations, the hinged door of the suspension type is provided with a semi-circular carrier, on the base of which the reflector is mounted and the whole fitment swings clear, with the door and glass bowl, when the lamp is cleaned. For the upright "Rochester" the reflector is mounted on a rod of requisite length carried in a base plate, which is placed upon the cast-iron base or "box" of the lamp and secured by means of a hinge on one side and winged nut the other; slacking of the winged nut permits the whole fitting to be swung outward on the hinge, and so leave the lamp free for any attention in the usual way.

Flood Lamp by Sugg.

The extraordinary interest shown in the floodlighting in London during last year has awakened interest in the great publicity value of such lighting, and much good business is to be done by gas undertakings who take advantage of the vogue. Messrs. Sugg are showing a type of flood lamp, illustrated here, which was employed in the London scheme and which has since been in growing demand in connection with organized shopping weeks, big stores, civic functions, promenades at seaside resorts, and so on.

That gas for indoor lighting can still be very attractive is exemplified by the handsome panel fittings included in the exhibit. The pendants are equipped with switch control, and usually the switch is concealed in the tassel. Similar attractive fittings are available for wall and for corner fitting.

The stand houses examples, too, of the latest developments in Messrs. Sugg's better known products, including the "Rochester," "Windsor," and "Promenade" lamps, the "Eton" cooker with its big oven capacity, and "Red Sphinx" gas fires, with their incurved fuel formation. A useful model is that with firebrick setting and extensible flat-fronted fender.

Sutherland Meter Company, Ltd.

Electric Avenue, Witton, Birmingham.

Here are to be seen two working models of the firm's "Radial Ducoin" meter, and also of the "Standard Ducoin" meter. The Company are also making a show of a special testing instrument which has been designed to assist the salesman in the gas showrooms to demonstrate to prospective consumers exactly what volume of gas is consumed by any particular piece of apparatus, such as a gas fire or cooker.

A. G. Sutherland, Ltd.,

Warwick Road, Greet, Birmingham.

This Company are showing a complete range of "AGS" dry gas meters, a speciality being made of high-capacity

meters. Interesting developments in prepayment attachment construction are also included. Meters in various stages of construction are shown, enabling close examination of component parts.

Gas Fire Radiant by Tennant.

J. Tennant & Sons,

Hawthorne Street, Warrington.

On this stand is shown a full range of "Super Raydiants" suitable for all types of gas fires. The display is specially designed to enable visitors to investigate the many qualities of these radiants, which incorporate the results of the firm's exhaustive experiments. The "Raydiants" show a decided improvement over last year's exexhibits, in thermal efficiency, structural strength, and lasting, glowing brilliance.

An entirely new departure is the synthetic cinder. Incorporating the advantages of the conventional type of gas fire radiant hitherto universally used, these synthetic cinders also possess additional qualities, chief among which is their close resemblance to a cheery coal fire.

Timmis & Co., Ltd.,

Stourbridge.

For the first time this firm are showing their new "Rayax" brand refractory. This material, which is exceptionally hard, has a refractoriness of well over cone 35, and a refractory under-head test of 50 lbs. to the sq. in. of cone 31. This material should prove satisfactory in the hottest part of vertical retorts, as it tends to get even harder during use.

They are also showing their "Lava" brand of aluminous grog refractory, which is doing excellent service in vertical retorts where conditions of slagging are encountered in conjunction with high temperature. This material is gradually becoming standardized for use in water gas generators and in the walls of both horizontal and vertical retort installation generators. Another product is their "Dome" insulating brick.

Tubes, Ltd.,

Rocky Lane, Aston, Birmingham.

This firm are exhibiting examples of their cold drawn weldless steel tubes of ¼ in. to 14½ in. bore; also boiler and flue tubes, steam pipes, and back axle and torque tubes for the motor trade. The tubes are in "Resistco" stainless and special steels.

The Vulcan Stove Company, Ltd.,

Exeter.

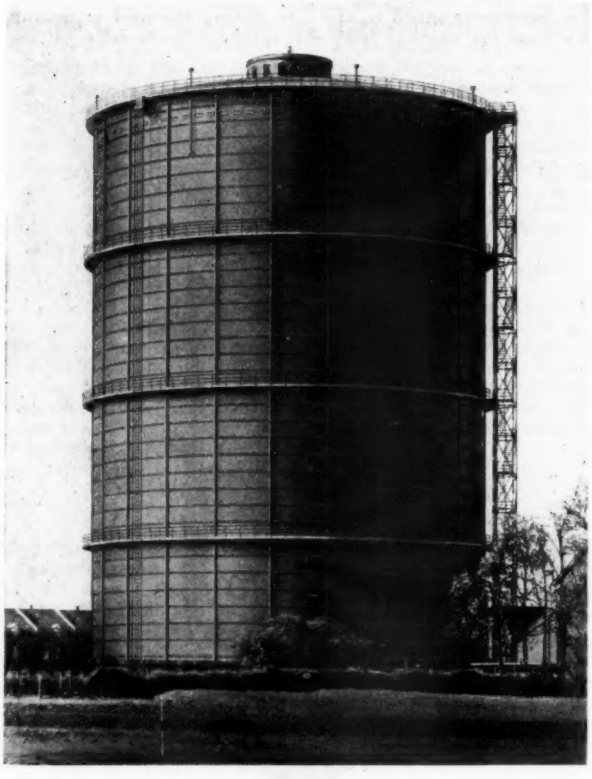
The Vulcan Stove Company are showing a range of their cookers and gas fires, &c. The cookers are finished in their "Ceramic" porcelain enamelled finish and include examples of their new patent "Equi-Heat" oven. This oven has the great advantage of being free from zones of unequal temperature, there being very little heat variation throughout the whole oven. The advantage gained will be appreciated more especially when thermostatic oven heat control is employed.

The gas fires exhibited comprise various finishes, including the "Vulcalose" metallic finish and gas fires with surrounds *en suite*.

C. & W. Walker, Ltd.,

Donnington, near Wellington, Salop.

This firm are exhibiting a full-size model of a portion of the piston of a waterless gasholder showing the new form of flexible gas-tight joint ring between piston and shell of holder, a method which does not necessitate a liquid of any kind for sealing purposes. Such holders do not require additional plant, such as pumps. They are particularly suitable for outlying districts, mining, and other areas where subsidence is likely to be met with. Holders of this kind are in use at collieries, mines, gasworks, iron, steel, and chemical works in, among other places, France, Germany, Switzerland, Belgium, Italy, S. Africa, and U.S.A. To engineers requiring a waterless holder of simple construction, giving constant pressure and demanding little or no attention, this design must appeal strongly. An illustration of a holder of this kind is given below.



Waterless (Klonne) Gasholder.

A Milbourne oil bath lubricated roller carriage for spirally-guided gasholders is also exhibited, as well as a "P. & A." tar extractor which has a number of interesting features. Also shown is the Milbourne-Beard joint for purifiers, in which the rubber or other soft packing is held in position throughout its entire length on both sides, making direct contact between curb and cover. In addition, there are wood grids for purifiers and devices for scrubbers, examples of welded work, models of various items of gas-works plant, and photographs of plant erected in well-known gas-works, comprising purifiers, gasholders (spiral and guide framed) condensers, washer-scrubbers, "P. & A." tar extractors, &c.

Waterless Gasholder Company, Ltd.,

13, Rood Lane, E.C. 3.

The world total of "M.A.N." waterless gasholders at Dec. 31, 1931, was 237, representing a total storage capacity of 641,136,800 c.ft. In Great Britain to date, 28 of these holders have been ordered, ranging in capacity from 250,000 to 8,000,000 c.ft., and covering a variety of storage purposes, including coal gas, water gas, blast furnace gas, producer gas, and coke oven gas.

A large selection of photographs of these holders are on view at the Company's stand.

The firm are also exhibiting a working scale-model of the waterless holder, a full-size section of the tar seal, and large constructional drawings detailing various features of the holder.

White Tile Heaters, Ltd.,

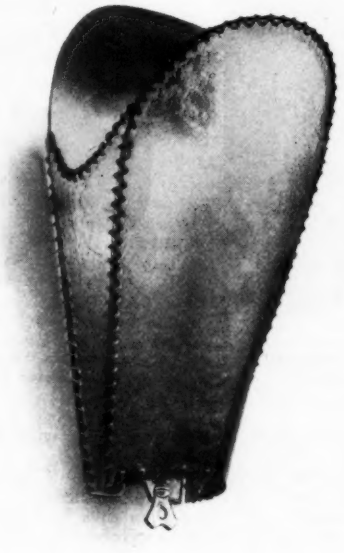
Clementhorpe Works, York.

Lambert water heaters, of both instantaneous and storage types, with their characteristic white tile appearance, are exhibited on this stand. Lambert gas cookers in new designs are also prominently displayed. Also shown are lagged and unlagged water containers of various sizes.

Wm. Whitehouse & Co., Ltd.,

Birmingham.

Many lighting fittings are exhibited by this firm for the first time. They include open bottom bowls made in a new material for gas lighting and original ideas of table standards and wall brackets. The latter are quite new in conception, and we reproduce a photograph of one of the range. The metal reflector back is chromium plated, and the front screen is made of patent "Silkose" material, which the firm have the sole rights of handling. This is offered in various colours, and gives a brilliant iridescent effect.



A Panel Bracket in "Silkose," by Whitehouse.

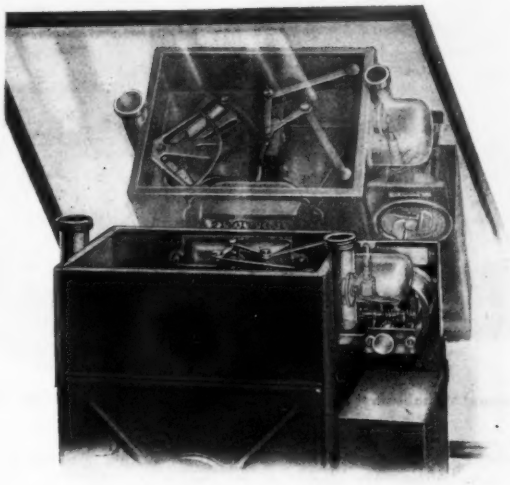
The bracket includes an internal burner with by-pass, and the light is turned on and off simply by the thumb plug at the bottom of the bracket. Also shown is a range of main gas cocks, union cocks, joints, &c.; also plain slot brackets and plain 1-light pendants.

Willey & Co., Ltd.,

Exeter.

This is a technical display of working models of meters fitted with the new "Radial" valves. There are two working models of small "Radial" meters, prepayment and ordinary; and a nicely finished model of the latest "Ducoin" attachment is also shown. This attachment can be changed from penny to shilling slot by only a simple movement on the front change plate.

There are also two novel demonstration models, one proving the adequate seal of the "Radial" type valves under gas pressure, and also a skeleton 6000 c.ft. meter in which the links, crank, and valves rotate without any apparent motive power. A notable feature is the automatic lubrication of the working joints as the meter passes gas.



Willey's "Radial" Movement.

This should attract visitors who are interested in meters, for it is a novelty to see the huge valves moving without being enclosed or gas passing. The new flexible bosses are also shown on this large meter. Cabinet prepayment gas fire meters are also on view, and a complete range of main cocks and pressure gauges.

George Wilson Gas Meters, Ltd.,

Foleshill Road, Coventry.

On the stand of this firm the gas meter is shown in various stages of its manufacture. Working models of three meters are shown in different stages of production.

In the new meters, not only is the gas undertaking considered, but the requirements of the consumer are also borne in mind. Hotel meters with indices on the top are shown enclosed in tasteful cabinets. Prepayment meters, fitted with attachments to take either shillings or pennies, at the will of the consumer, or again meters fitted with convertible prepayment attachments, are on view. These latter are an important step in the direction of economy, since they reduce the necessity for gas undertakings to stock two types. Another meter on Messrs. Wilson's stand is fitted with an attachment designed to meet the two-part tariff need, thus putting the slot consumer on the same footing as the ordinary user.

Another interesting exhibit is the Rutten safety valve, which, by rendering possible the fitting of automatic water heaters and geysers to slot installations, again gives equal facilities to the slot and ordinary consumers.

Gas meters are not the only exhibits on the stand. Notably among others is a coke grate, which is demonstrated to show economy with efficiency. It is of entirely new design, and no structural alterations to existing fireplaces are necessary to its fitting.

Wilsons & Mathiesons, Ltd. (Radiation Ltd. Proprietors),

Leeds.

Wilsons & Mathiesons, Ltd., have contributed a cooker in "Beau" enamel finish; a "Sunbeam" "Major" fire in an attractive pearl-green, and also a "Loga" fire in pearl-pink finish. The "Loga" is a notable exhibit, as it incorporates a most ingenious boiling-burner in the canopy. The design of the fire itself is in keeping with the best

traditions of the Industry, and is suitable for any scheme of interior decoration.

Wilsons' "Sunbeam" "Major."

Wilsons' "Loga" Gas Fire.

Further examples of the extended range of this Company's activities are also included on this stand.

John Wright & Co. (Radiation Ltd. Proprietors), Birmingham.

Thermal storage water heaters are expected to be prominently featured on this stand. Wright's have met with very gratifying success in this field, and their faith has been amply rewarded if only by the popularity of their "Sunhot" water heater, a 20-gallon model of which is shown, finished attractively in cream enamel. So effectively insulated is this "Regulo"-controlled storage heater that it maintains a constant supply of water at 140° Fahr. with a maximum gas consumption of only 10 c.ft. per hour, and a cut-down consumption of 2 c.ft., when the contents of the storage again reach the maximum temperature after hot water has been withdrawn.

The low consumption of the "Sunhot" enables it to be installed without a flue or the necessity for enlarged service pipes or meter. It is made in two types, suitable for hard water and soft water districts respectively, and a recent development has been the introduction of a ball-valve "Sunhot." This, as its name indicates, is fitted with a ball valve to enable it to be connected direct to the main water supply for flats and other premises when a cold water feed cistern is not available.

Another interesting hot water exhibit is the "B.T.U. Junior," a heater unit similar to that of the "Sunhot," but designed for use with an existing storage tank or cylinder. It can be coupled up to any flow and return system already installed, and worked in conjunction with the back boiler of a range, or independently of the range. The model exhibited at the Fair is shown installed with storage cylinder, the cylinder and pipes being insulated with "Eeto" lagging—a material Messrs. John Wright & Co. have specially selected for their hot water installations after exhaustive tests with various coverings.

A new appliance which will certainly find favour with the feminine public is Wright's "Hotwell Junior"—the "baby" of the water heater class, small in size but large in performance. Expressly designed for the supply of hot water in the scullery or at the kitchen sink, its operation is entirely automatic. Water temperature and gas consumption are thermostatically controlled. It takes only 30 minutes to heat 2 gallons of water to the right temperature for washing dishes, and maximum and cut-down gas consumptions are the same as for the "Sunhot." It is compact, attractively finished, easily installed, and takes up little wall space.

The "St. George" radiator shown is designed to economize space. Its height, without legs, is only 30 in. This means that it can be placed beneath a window or elsewhere where headroom is limited. Its depth of 7 in. is a great asset when installed in corridors and passages. Each "St. George" (like its forbears, the "St. Vincent," "St. Martin," and "St. David" radiators) is an independent and complete heating unit, "Regulo" controlled. Cleaning is rarely needed, but when it is, the removal of a few screws gives access to the burners and flue bases, without disconnection of the gas service.

The firm also show the "St. Vincent" radiator in an attractive old gold finish, which will tone with almost any scheme of decoration.

No Wright display would be complete without the "Eureka" "New World" gas cooker. This year's model is in the "Beau" enamel finish, a beautiful glistening surface of olive green, cream, and ivory, with chromium-plated fittings.

Add to the aforementioned, the "Inigo" fire in old copper "tone"—a new and serviceable addition to the beautiful series of "tone" colours featured by this firm—and our survey of Wright's exhibits is complete.

Wright's "Sunhot" Storage Heater.

Wright's "B.T.U. Junior" Water Heater.

MISCELLANEOUS EXHIBITS *Of Interest to our Readers*

Anglo-American Oil Company,

36, Queen Anne's Gate, S.W. 1.

This Company show a number of products refined and manufactured at Fawley Refinery, in Hampshire, including Pratts motor oil and lubricating oils, blended in England. After over forty years' steady growth, the Anglo-American Oil Company now employs nearly 8000 British workpeople, and indirectly provides an immense amount of British employment in the maintenance of its vast fleet of railway tank-cars, lorries, tank-wagons, and ocean-going oil tankers.

Products such as Pratts "High Test" and Pratts Special "Ethyl" petrol are now associated in the public mind with such outstanding events as the Schneider Trophy, the world's fastest speed of 407 miles an hour, the world's land speed record of 245 miles an hour, the Isle of Man T.T., in which all three trophies were won by the product of one petrol Company for the first time in the history of the race, and the Ulster Grand Prix, which holds the palm for the fastest road race in the world.

Ashmore, Benson, Pease, & Co., Ltd.,

Stockton-on-Tees.

This firm are exhibiting in conjunction with the Power Gas Corporation, Ltd., and are showing a full-size section of the sealing device employed in the Klönne dry gasholders which affords an excellent opportunity for an inspection of the construction showing details of how the seal between the piston and side sheets is effected by lubricated packing rings.

Also on the stand are an autoclave lead-lined by the K.K.K.-P.G.C. process suitable for working pressure up to 400 lbs. per sq. in. with steam jacket pressures up to 100 lbs. per sq. in., and a homogeneously lead-lined heat interchanger in part section by the same process. There are a few other specimens of homogeneous linings.

A "Weldanka" autoclave is on show constructed of an inner and outer shell, the inner shell being 10¾ in. in diameter by ⅜ in. thick, constructed of "Weldanka" acid-resisting steel plate, and angles welded together. The cover is a "Weldanka" casting, the outer shell being of mild steel. This type of vessel is used for boiling up various fluids by means of steam. Then there is a "Calandria" of Staybrite patent F.S.T. steel, with tubes of the same material. This type of vessel is used for evaporating large quantities and is suspended inside an outer casting, steam being passed round the outside of the tubes while the fluid being dealt with passes through the tubes and is so heated.

A model 500-ton blast furnace, complete with all auxiliaries, now being built for the South African Iron and Steel Industrial Corporation, Ltd., at Pretoria, is exhibited.

Among other items may be mentioned models of a "Forter" valve and the Parkfield patent fastener for purifier covers, &c.

W. & T. Avery, Ltd.,

Soho Foundry, Birmingham.

A range of machines is presented in a manner calculated to illustrate how Avery can weigh everything from a silken thread to a locomotive. Down the centre of the stand is a tier of steps mounting up to a central pedestal, on which is a modern Industrial Visible Weigher of the portable platform type. On each step is a modern scale ranging from a fine weighing scale up to one of heavier capacity.

At one end of the stand is a huge assay balance with a capacity of 56 lbs., in a glass case, while at the other end of the stand is a picture gallery in which is exhibited, among others, a large photograph of the streamlined locomotive No. 10,000 recently put into commission by the L.N.E.R. Company. This locomotive is shown on a set of Avery automatic locomotive balancing tables.

On each side of the central display are a few modern weighers of varying capacities and for various purposes.

Pre-Determined Sack Weigher for Checking Coke into Sacks in Gas-Works.

The latest type unit count machine for the mechanical counting of repetition work is exhibited on the stand.

Babcock & Wilcox, Ltd.,

Farringdon Street, London.

A full-size section of the boiler now being supplied to H.M.S. "Guardian" is shown, together with a model of a complete S.X. boiler. Both of these were exhibited at the Shipping, Engineering, and Machinery Exhibition last year at the Olympia. The exhibit of plate type air heater consists of a full sized air heater two sections high. The great advantage of this air heater is that corrosion of the plates generally affects the cold end of the plates only. With this design of air heater it is only necessary to replace the section at the cold end without disturbing the rest of the air heater.

The firm's exhibit also includes a full sized chain grate stoker 11 ft. wide by 14 ft. long. This exhibit is in operation, and sections only of the chains are linked up so that the system of air admission may be plainly visible. The air is admitted through the return run of the chain, so that there is a maximum advantage obtained in the cooling of the links. There is also a large number of different types of valves on the stand, together with examples of modern constructions of piping. Among the valves is an 8 in. parallel slide valve, fitted with Babcock-Tate electrical valve control in operation.

There are, in addition, photographs of low-temperature distillation plant, together with a chart of the bye-products obtained therefrom, and samples of each.

The full sized automatic lubricator for conveyor chains is shown, this being a very recent innovation which is stated to have been highly successful.

Edwin Danks & Co. (Oldbury), Ltd.

The exhibit of this Company consists of a 14 ft. by 8 ft. "Economic" boiler with smoke box and a half Lancashire boiler 9 ft. diameter. The inside of the Lancashire boiler forms part of the firm's office.

Spencer Bonecourt.

The chief field of this Company's operations is in waste heat recovery in the gas and steelwork industry, and their

exhibit consists of photographs and drawings of typical installations.

Calorizing Corporation.

This firm is exhibiting calorized pressed steel boxes and pots for case-hardening, annealing, cyanide, lead, and salt hardening, and also calorized solid drawn steel pyrometer sheaths.

British Road Tar Association.

The British Road Tar Association are exhibiting this year in the Quarry Section. The stand consists of an attractive cinema theatre, accommodating 45 people, in which the Association's industrial talking film "Coal Mine to Road" will be exhibited. This film has been made at coal mines, coke ovens, gas-works, tar distilleries, and on the highways and streets all over the country. It shows that tar is an all-British material and that every penny that is spent on tar goes to workers and producers in this country.

British tar can justly claim to have been the earliest of all modern road-surfacing materials. British tar to Standard Specification has all the characteristics essential for the construction of road surfaces capable of withstanding modern traffic conditions, and is easy to apply and economical to maintain. Throughout the country, tarred surfaces are becoming increasingly recognized as being by far the safest for all classes of traffic. In addition, the non-skid properties conferred by the use of tar on existing smooth road surfaces are now universally admitted. The British Road Tar Association invites all those who are interested in the construction and maintenance of roads to visit their stand, where every opportunity will be given to discuss questions relating to the use of tar for roads with technical representatives, who will be in attendance and where they will have the opportunity of seeing the talking film "Coal Mine to Road."

British Thomson-Houston Company, Ltd.,
Rugby.

Various novel devices are in operation on this stand. Two of these are operated by standard B.T.H. photo-electric relays, the third being controlled by a thyratron.

The purpose of a photo-electric cell is to obtain an electric current from light energy in order to actuate an electrical instrument, such as a loud speaker for use with talking films, or a relay for the operation of signalling, lighting, and other control devices. Further applications of an industrial nature are sorting and counting of articles, smoke and fog detection, elevator control, traffic control, railway signal control, the control of artificial illumination according to the variations in daylight intensity, fire alarms, and testing the quality of dyes, papers, oils, &c.

One of the devices shown on the stand, incorporating a photo-electric cell, is that in which a lighted match is applied to the bulb of a lamp and the lamp lights. Another interesting device in which a photo-electric cell is used is an invisible ray burglar alarm, which operates when a beam of invisible rays is interrupted. These rays, obtained from a small electric lamp shielded by a special filter, impinge on a photo-electric cell.

An exhibit of interest is one in which a thyratron is used. The thyratron is a hot cathode mercury vapour valve with grid control. In the demonstration it is arranged so that an alteration in the value of the capacity associated with the thyratron grid alters the grid voltage, which allows an arc to flow through the thyratron. The arc current is made to operate a contactor controlling a floodlight. The great sensitivity of the thyratron is shown by the fact that it is sufficient to bring one's hand near to the concealed metal plate to alter the capacity sufficiently to switch on the spotlight.

Cambridge Instrument Company, Ltd.,
London.

A wide range of automatic temperature control apparatus is shown by this firm. An interesting exhibit is a three-zone distributor, a photograph of which we reproduce. In some applications it is necessary to control three furnaces, or three zones of one furnace, at the same temperature or at slightly differing temperatures. For such purposes a three-zone distributor can be used, in conjunction with a controller. This accessory, which is shown attached to the controller in our illustration, comprises a series of six mercury switches arranged in pairs (*i.e.*, two to each zone to be controlled), each pair of switches being tilted in turn by means of six cams mounted upon a slowly rotating shaft coupled to the driving shaft of the controller. Each pair of mercury switches is connected in circuit with the switch or mechanism controlling one of the three zones, and the distributor automatically connects the controller to the three zones in turn. The speed of operations is such that the connections are changed over once every ten seconds, a complete cycle of control being thus obtained in 30 seconds. The three-zone distributor, which is attached to the left-hand side of the controller, as shown in the photograph, is contained within a robust metal case, a separate cover being provided for the terminals at the base of the instrument. In our illustration the cover of the case and the terminal cover have been removed to show the mechanism.

Three-Zone Distributor Attached to Controller.

Also on view is a combined temperature and humidity recorder. In addition, the firm are exhibiting a number of models of surface pyrometers, resistance thermometers, thermo-electric outfits both of the indicating and of the recording type, draught and pressure gauges, index thermometers, specially mounted glass thermometers suitable for molten metals, jam boiling, and varnish manufacture.

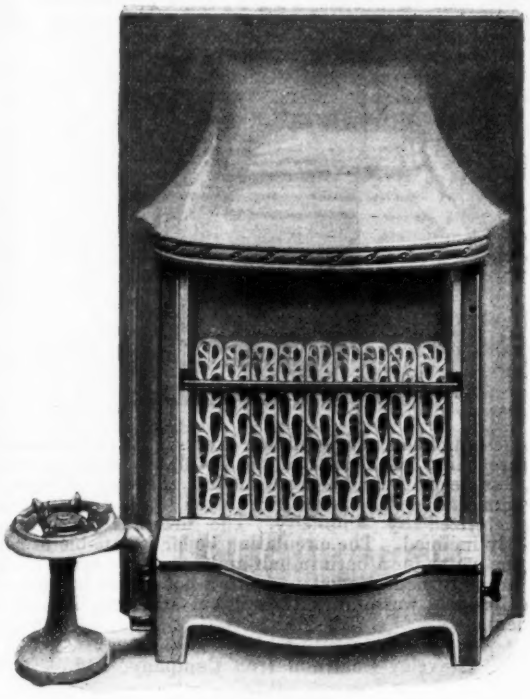
Carron Company,
Carron, Stirlingshire.

Among the wide range of the productions of Carron Company, Carron, Stirlingshire, on view, space has been found to display some of their gas cooking and heating appliances. An all-enamelled cooker is shown fitted with the "Carrontrol" heat regulator. Heating appliances are

Carron Cooker, with "Carrontrol" Regulator.

represented by gas fires and gas mantel registers. In two of the fires, their usefulness has been increased by the fitting of a pedestal boiling burner. Two gas mantel registers

find a place, one of which has the mantel enamelled in imitation of mahogany wood. This imitation finish has a rich and natural appearance and is claimed to be unaffected



Carron Fire, with Pedestal Boiling Burner.

by heat or other climatic conditions. Practically no cleaning is required beyond an ordinary dust or an occasional rub with a damp cloth.

Thomas Chatwin,

Victoria Works, Birmingham.

On this stand are to be found hand and power drive screwing machines with capacities from ¼ in. bolt to 8 in. pipe; stocks and dies, including the new "Y" pattern chaser-die stock; taps, reamers, and twist drills of every type, and pipe cutters, vices, and wrenches. The chaser-die stock, which is an entirely new production, is designed and manufactured on the best engineering principles to cut B.S.I. taper thread. Accurate adjustment of chaser-dies is obtained by control of the eccentric coupled to the cam plate by a spring plunger. Setting lines for accurate size are marked on the eccentric and the eccentric housing. This ensures great accuracy, one-eighth inch error on the eccentric resulting in only a few thousandths of an inch error in the diameter of thread. Tube guides have the same type control and are placed a generous measurement forward of chasers, thus eliminating the possibility of threads being cut untrue to tube.

S. A. Daniell,

Lion Works, Birmingham.

This firm are showing their standard "Lion" brand productions, including screwing machines and accessories for iron gas tubes and bolts; engineers' and gasfitters' stocks, dies, and taps; tap wrenches, reamers, twist drills, tube cutters, tube wrenches and tube vices; and joiners' flooring cramps.

Alexander Duckham & Co., Ltd.,

16, Cannon Street, E.C. 4.

On this stand are to be seen "Morrisol Sirrom (Regd.) Brand" commercial engine and transmission oil for Morris commercial cars; Duckham's soluble and cutting oils; "Immutol" slush; hygienic floor preparation ("Floradcol"); high-speed worm gear oil ("D.B.S."); easing oil; hand cleanser; and ball-bearing grease ("H.B.B.").

"Morrisol Sirrom (Regd.) Brand" is the only oil recommended by Morris Commercial Cars, Ltd., and is manufactured and distributed solely by Alexander Duckham & Co.

An oil fountain and soluble oil fitment show the oil being injected into water.

Matthews' Syphon.

The Matthews gasholder syphon, an example of which is being shown, has for its object the dispersing of rain water and overflow from gasholders.

Four Oaks Spraying Machine Company,

Sutton Coldfield, Birmingham.

On this stand is a wide range of spraying, limewashing, and disinfecting machines of all types suitable for all purposes. For several years past this Company have been doing considerable business with all the leading gas undertakings in machines for limewashing and whitewashing; but lately a new use has arisen for "Four Oaks" machines for spraying liquid cement into hot vertical gas retorts. Special machines have been designed with iron pumps and steel nozzles, and these have now been adopted at the Birmingham Corporation Gas-Works and also in many other large works.

Fraser & Chalmers Engineering Works

(Proprietors: The General Electric Company, Ltd.), Erith.

This exhibit includes a selection from the wide range of plant manufactured at Erith, such as conveying and screening plant, and rolling mills. Most of the machines shown are in operation, being driven by Witton squirrel cage motors with direct-to-line contactor starters.

The conveying plant will include two 16 ft. Fraser & Chalmers-Redler conveyors which form an economical solution to the problem of conveying powdered, granular, and small lumpy substances. The conveying is done on a chain which consists of suitably-shaped links between which some of the material collects to form a belt on which the remainder is conveyed in a quiescent mass. The conveyor is totally enclosed and is therefore dustless and weather proof; over small spans it is self-supporting, and it can be extended very cheaply. The speed is slow, so that the wear and tear are negligible. Capacities up to 200 tons per hour have been obtained, and the power consumption is very low, both the conveyors shown being driven by one h.p. motor. A complete range of Redler machines for conveying, elevating, measuring, and blending is available.

Round two sides of the stand run a Webb conveyor, a type that has only recently been introduced to this country for the circulation of raw material and work in production in factories. The machine is flexible and can be adapted to any conditions. The example shown is driven by a ¼-h.p. motor.

The Sherwen screen incorporates a new principle in vibrating mechanism. The moving frame is mounted on spring slats of hickory or ash and given 2400-3000 vibrations per minute by two solenoids controlled by a make-and-break mechanism. The amplitude and rate of vibration and the screen angle can be adjusted during operation. There are no bearings, pulleys, belts, or shafting, and the power consumption is very small. The same principle has been successfully applied to concentrating tables for coal, sand, slimes, &c.

The more usual types of conveyors and screens are exemplified by a 20-ft. portable conveyor and a single-deck Gyrex screen, both of the Robins type and driven by 3 h.p. and 5 h.p. motors respectively.

A model washer is shown to demonstrate the principle of a patent sand flotation process of washing coal that has recently been introduced. This process is a commercial application of the laboratory float-and-sink tests, which are used for determining the washability of coal. The mixture of sand and water is kept in a fluid state by mechanical and hydraulic agitation. The density of the

sand and water mixture, which can be varied, is arranged so that the coal floats and the dirt sinks.

A steam-heated dryer is also shown, the steam flowing in two directions. The steam flows through the inner drum and returns by way of the outer jacket. The dryer is used for drying coal and other material where the maximum temperature must be limited.

The whole of the motors and control gear used to operate the exhibits was made at the G.E.C. Engineering Works, Witton, Birmingham.

London Aluminium Co., Ltd.,

Witton, Birmingham.

In a very comprehensive display of aluminium goods in the " Diamond " range, particular interest for our readers will attach to cooking utensils expressly designed for use with gas cookers, to which this firm have given much attention. Special prominence will be given to a new development of the treatment of aluminium articles. These will be shown " Anodised." The Anodic process for which a new plant has just been installed consists of an electrochemical treatment of aluminium by which the natural oxide film always present on the surface of aluminium is increased and compacted into a pearl-grey coating which is impervious to atmospheric corrosion and highly resistant to the action of many chemicals. A separate special stand will be devoted to a variety of new and interesting developments in the use of aluminium for industrial and architectural purposes, and the exhibits will be selected with a view to encouraging new uses for aluminium and its alloys.

Meldrums, Ltd.,

Timperley, near Manchester.

Messrs. Meldrums, Ltd., occupy increased space this year in order to give a better display of their well-known specialities. The Cochran boiler, which supplies steam for heating and cooking in the Exhibition Hall, is this year fitted with Messrs. Meldrums' forced-draught system. This comprises one of their furnaces specially designed for Cochran boilers, together with smoke prevention door. Messrs. Meldrums claim that theirs is the only furnace for vertical boilers in which the whole of the grate area is actively used.

The chief feature on the stand is a full size " Lancashire " boiler front. One-half of this front shows the firm's latest design of sprinkler stoker. This stoker is arranged with the firm's new type of self-contained motor drive. This obviates the necessity for putting up overhead shafting, and makes an extremely compact arrangement. On the other flue is shown the firm's automatic chip stoker for wood refuse; this is also a new design. The wood chips are delivered from the cyclone collector into the hopper and automatically delivered into the boiler furnace. A flue section is exhibited containing the well-known " Meldrum " forced-draught furnace. Over 20,000 of these furnaces have been supplied for burning fuels of every description. They are fitted with efficient smoke preventers.

Messrs. Meldrums' activities in chemical plant are illustrated by one of their new design centrifugal acid pumps. This is constructed in the firm's well-known " Meldrum " acid resisting metal, which is entirely proof against sulphuric, nitric, and acetic acids. They also show a wide range of cocks and valves of every description, steam jet elevators, exhausters, compressors, and boiling jets. These are manufactured in " Meldrum " metal, " Regulus " metal, gun-metal, and cast iron.

Quasi-Arc Company, Ltd.,

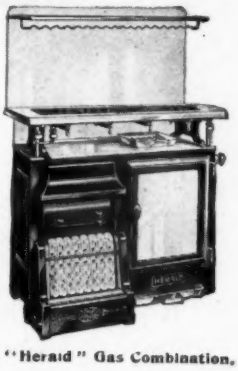
15, Grosvenor Gardens, Victoria, S.W. 1.

This firm, who claim to be the pioneers and largest manufacturers of electrodes and arc welding equipment in this country, exhibit several of their standard types of welding sets, examples of welded construction, and samples of each of their range of " Quasi-Arc " patent electrodes. Their stand contains welding bays supplied with current from one of their standard three-operator alternating current transformer welding sets. This set is in operation on the stand, and demonstrations of welding are given. Their special " Railway Type " petrol engine driven set, portable transformer, and motor generator sets are also shown. The examples of welded construction shown comprise many types of welded joints, &c. Several of the test pieces on view represent the basis on which Lloyd's Register of Shipping and the British Corporation for Survey and Registry of Shipping gave their approval for welded ship construction. Interesting photographs will be displayed giving views of some of the largest and most important of welded structures which have been carried out in different parts of the world by use of " Quasi-Arc " Electrodes and Equipment. Members of the Company's technical staff will be in attendance on the stand and will be very pleased to assist visitors interested in Arc Welding.

R. Russell & Sons, Ltd.,

Peel Foundry, Derby.

The new " Herald " gas combination grate (illustrated herewith) is shown for the first time on this stand. In one compact unit are combined a gas cooker with automatically controlled oven, a gas fire, and a gas circulating boiler.



New "Herald" Gas Combination.

The design of this new appliance is attractive, a noteworthy feature being the design of the hotplate, which is wider, but less deep, than the usual model. Three " efficiency " burners and grill burner are fitted, and the bars are characterized by simplicity. The fire has its radiants slightly inclined. The circulating boiler is capable of heating the water for a bath in half-an-hour. The space behind the fire is turned to good account, a hot locker being available for dish warming. An original accessory is a spoon holder.

Staveley Coal and Iron Company, Ltd.,

Chesterfield.

This firm are exhibiting their sand-spun pipes of the socket and spigot type; cast-iron pipes (vertical cast), socket and spigot type; and also concrete lined and flanged pipes; specials for both above classes of pipes. Types of coal of various grades for gas, steam, and household use are shown as obtained from the firm's pits, in addition to pig iron, tarred slag, dry slag, chemicals, and various grades of salt for all uses.

Stewarts & Lloyds, Ltd.,

Birmingham.

A demonstration in the " Quarry to Road " section of the Fair is given in the laying of a 4-in. steel gas main with " Victaulic " patent joints. A feature of the demonstration is that it is not being accelerated for show purposes, but is being laid at the rate found to obtain in ordinary every-day " Victaulic " practice. Although the joint can be made in less than two minutes and is then absolutely leaktight, it allows for expansion and contraction and vibration due to heavy traffic. Applications of particular interest are the use of the joint for coupling pipes across bridges, notable examples being the 20-in. gas mains over the River Usk Bridge at Newport (Mon.), 24-in. mains at Barking Creek for the Gas Light and Coke Company, and 18-in. mains over the new Lambeth Bridge in London. The Brighton, Hove, and Worthing Gas Company have laid a line of about 1100 ft. in length over the Southern Railway Bridge at Shoreham, where the deflection in places is 1 in.; and tests were made up to 30 lbs. per sq. in. air pressure during which the joint was perfectly tight.

In the Tokyo, Osaka, and Kobe districts, " Victaulic " mains have been installed, chiefly in sizes from 12 in. to 30 in. diameter, and have sustained several earthquake shocks without damage. In these three cities there are over 100 miles of " Victaulic " piping of these sizes, while in the vast oilfields natural gas mains equipped with " Victaulic " joints are used extensively for pressures up to 700 lbs. per sq. in.

Thomas & Bishop, Ltd.,

37, Tabernacle Street, E.C. 2.

The chief exhibit which is of interest to the Gas Industry is " Permac " metal-to-metal jointing material. " Permac " provides a very economical jointing that will stand up to excessively severe conditions. It is largely employed in the erection of sectional tanks and constructional plant used in oil or benzole recovery and in tar distillation and dehydration, and in the erection of plant for ammonia and naphthalene washing.

New "Ideal" Products and Prices.

On similar lines to the No. 1 G.B. Ideal Gas Boiler, which was introduced last year and has, we understand, met with much favour, the National Radiator Company, Ltd. (Hull), are now placing on the market a new series No. 2 G.B., particulars of which are given in a leaflet for insertion in the current catalogue. Another interesting catalogue inset gives details of the Ideal Classic boiler with the Ideal damper regulator and thermometer fixed directly into the top of the boiler instead of in circuit fittings at the side as hitherto. This new construction will be standard in future.

We learn that the Company have just distributed to trade customers a revised net trade price and discount sheet embodying reductions in the prices of all types of Ideal Rayrad, also the Nos. 00, 0, 1, and 01 Ideal domestic boilers and Ideal towel rails. The last named are now tested to 100 lbs. air pressure while immersed in hot water.

Fractional H.P. Motors.

The type of motor that should be used to drive any particular machine will depend on the character of the work it has to perform. There is a wide range of fractional h.p. motors manufactured by Metropolitan-Vickers Electrical Company, Ltd., of Trafford Park, Manchester, details of which are given in a leaflet published by the firm giving their various characteristics and specifications.

Among the points put forward in favour of these motors are: Starters are unnecessary, direct line switches being sufficient; connecting-up is therefore simply and quickly effected; A.C. and D.C. motors run at same speeds; lubrication needs attention only once every six months; the phosphor-bronze sleeve bearings of ample size have a long life and conduce to silent running; and all windings are thoroughly impregnated and vacuum dried.

The fields of application of various types of motors are set forth, including Universal motors for both A.C. and D.C. supply rated at as little as $\frac{1}{50}$ h.p.; A.C. (repulsion start) induction motors, for use in applications that have rigorous starting conditions as regards both the frequency of starting and the high torque required; also split-phase induction motors, which have a very wide field of application and require only a tumbler switch to control them; and finally the D.C. motors which are the counterpart of the A.C. split-phase motors, excellent commutation and quiet running being claimed as features of these machines.

Fifty Years of Service to the Industry.

In our columns last week we referred to the Jubilee of Messrs. Falk, Stadelmann, & Co., Ltd., in connection with which event the firm published an illustrated brochure. This traced the growth of the Company from the time when

Veritas House, London.

a staff of four occupied premises consisting of two rooms at 36, Basinghall Street, to the present establishment (illustrated here) and other premises exceeding half-a-million sq. ft. of floor space and employing, with its subsidiaries, over 2500 people.

ASSESSMENT OF GAS UNDERTAKINGS

FOR IMPERIAL AND LOCAL TAXATION

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A.C.I.S., A.L.A.A.

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THIS STANDARD WORK, which provides a concise account of the principles and practice of Assessment of Gas Undertakings, and simplifies income-tax and rating problems, will shortly be brought ENTIRELY UP-TO-DATE by re-publication, together with a SUPPLEMENT.

The Supplement includes notes on the relevant provisions of the Finance Acts of 1930, 1931, and 1931 (No. 2), as well as the appropriate resolutions of the Central Valuation Committee as affecting the rating of Public Utility Undertakings. The text extends to 104 pp. demy 8vo, and conforms in style to that of the original volume. It will be bound in stout blue boards and be available to owners of the original volume *at* 5/- ***post free.***

WALTER KING, LTD., "Gas Journal" Offices, 11, Bolt Court, Fleet Street, London, E.C. 4.

Distribution from Southend to Windsor—1870-1932

An Historic Record of Distribution at High and Medium Pressures in the Area of Supply of the Gas Light and Coke Company*

By H. J. Escreet, B.Sc., Assoc.M.Inst.C.E., Assistant Distributing Engineer, The Gas Light and Coke Company.

Introduction.

The high-pressure systems described are:—

(*a*) The Beckton system of trunk mains, which act as feeder and bulk supply mains covering the whole area, with the exception of the districts of the late Southend and Brentwood Companies, amalgamation with which was only effected on Jan. 1 last.

(*b*) The Grays high-pressure system, and

(*c*) The local high-pressure systems at Woodford, Richmond, and Pinner.

THE BECKTON MAINS SYSTEM.

The Beckton system of mains, although usually referred to as the high-pressure system, is worked at only medium pressures of up to 3 lbs. per sq. in. This system now has a total length of about 156 miles, the mains comprising it being of diameters from 12 to 48 in.† The system links up all the manufacturing stations of the Company, except Southend and Brentwood, and all but three of the holder stations; it also serves some fifty underground governors and five governor houses, in addition to the governors at the holder stations.

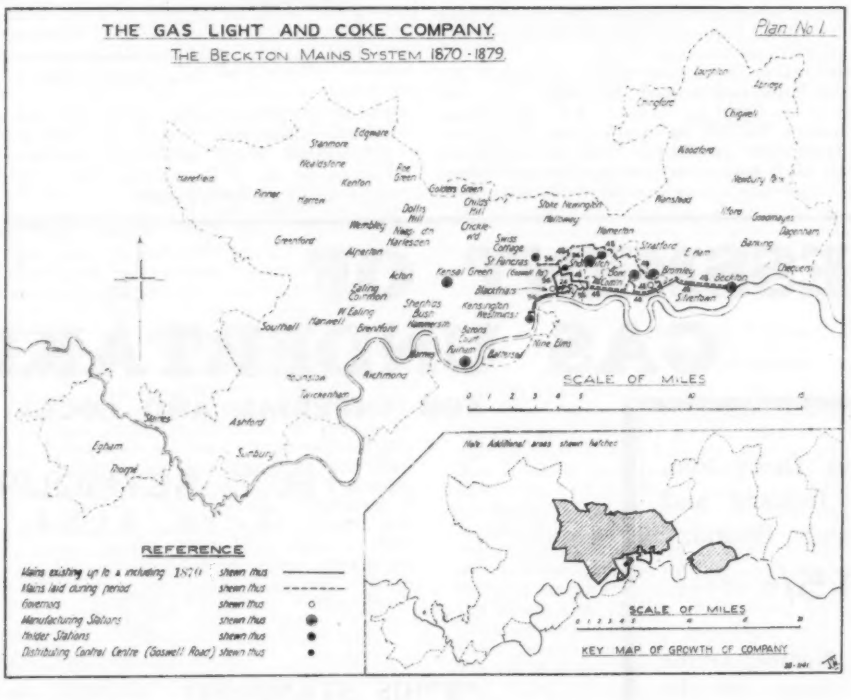
1870-1879.

The system had its origin in 1870, when the Chartered Gas Light and Coke Company built the Beckton Gas-Works and laid a 48-in. main from Beckton to their works in the City (Goswell Road) with a 36-in. extension to their works at Westminster (Horseferry Road). This 36-in. main also connected up the Blackfriars Works of the City of London Gas Company, which had just been amalgamated with the Chartered Gas Company.

These two mains formed the nucleus about which the Beckton system has been built up. The system has grown with the extension of the Company's area by amalgamation with other Companies, and the author proposes to trace this development, as briefly as possible, with the aid of a series of plans.

Plan No. 1 shows the Company's present area of supply (excluding the Grays, Brentwood, and Southend districts), the 48-in. and 36-in. mains referred to above being shown by heavy black lines.

During 1870, a second Company, the Great Central Gas Company, with works at Bow Common, was amalgamated with the Gas Light and Coke Company, and in the following year another 48-in. main was laid from Beckton to Aldgate, connecting up the Bow Common Works *en route*. This main was also linked up to Blackfriars by a part 36-in., part 24-in. main.


THE GAS LIGHT AND COKE COMPANY.
THE BECKTON MAINS SYSTEM 1870-1879
Plan No 1
SCALE OF MILES
REFERENCE
Mains existing up to & including 1870 shewn thus
Mains laid during period shewn thus
Governors shewn thus
Manufacturing Stations shewn thus
Holder Stations shewn thus
Distributing Central Centre (Goswell Road) shewn thus
Note Additional areas shewn hatched
SCALE OF MILES
KEY MAP OF GROWTH OF COMPANY

The manufacture of gas at Horseferry Road, Goswell Road, and a third works at Curtain Road was discontinued in 1871, and the Blackfriars Works was closed for manufacture in 1872.

Further amalgamations with the Victoria Docks Gas Company (works—Silvertown) and the Equitable Gas Company (works—Pimlico) occurred in 1871, and the Western Gas Company (works—Kensal Green) was absorbed in 1872, but these amalgamations did not then lead to any extension of the Beckton mains system.

In 1876, the Imperial Gas Company with works at Fulham, Pancras, Shoreditch, and Bromley, and the Independent Gas Company with works at Haggerston, were amalgamated with the Gas Light and Coke Company. A third 48-in. main was laid in 1878 to connect up the Bromley Works to the Beckton system, and 36-in. extensions were made to Pancras, Shoreditch, and Haggerston. These

* This account formed the subject of a paper before the London and Southern District Junior Gas Association.

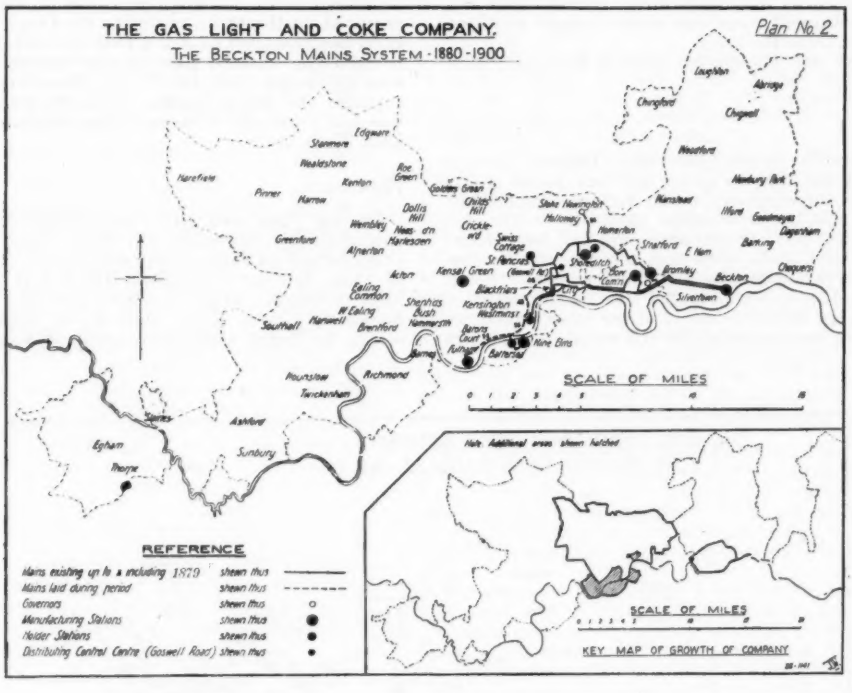
† The lengths of each size of main are given in Appendix I.

* In this plan and the following plans up to Plan No. 7, the mains existing at the beginning of the period covered by the plan are shown by heavy black lines, while the mains laid during the period are shown in broken lines. The small plan in the lower right-hand corner shows by heavy black lines the boundaries of the Company's area of supply at the beginning and end of the period, the areas added being shown by hatching.

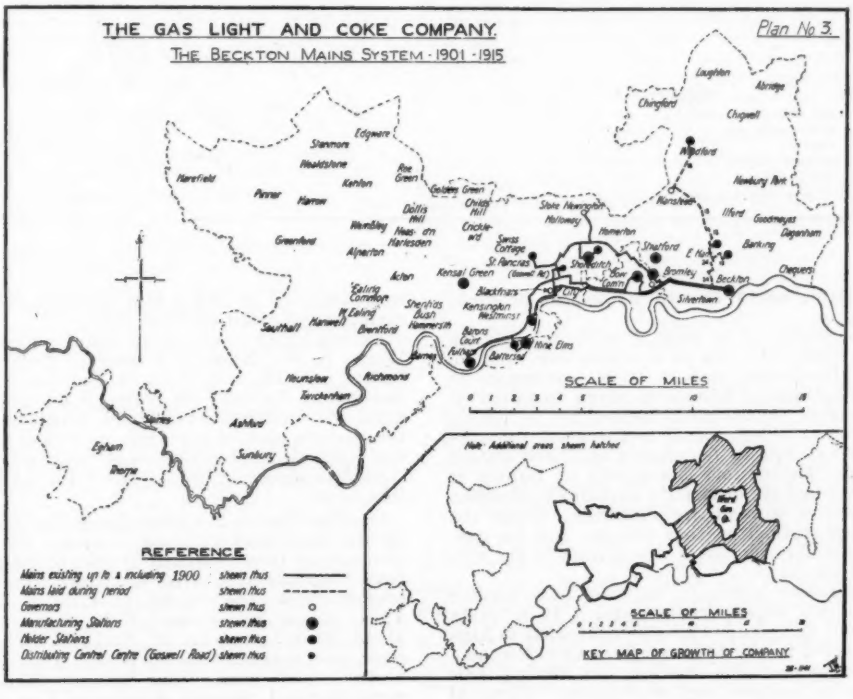
mains and the second 48-in. main are shown by broken lines on Plan No. 1.

1880-1900.

Plan No. 2 shows by full lines the mains laid prior to


THE GAS LIGHT AND COKE COMPANY.
THE BECKTON MAINS SYSTEM - 1880 - 1900
Plan No. 2
SCALE OF MILES
REFERENCE
Mains existing up to & including 1879 shewn thus
Mains laid during period shewn thus
Governors shewn thus
Manufacturing Stations shewn thus
Holder Stations shewn thus
Distributing Central Centre (Goswell Road) shewn thus
Note Additional areas shewn hatched
KEY MAP OF GROWTH OF COMPANY

1880 (as shown on Plan No. 1) and by broken lines the mains laid between 1880 and 1900. The first of these is the 36-in. main between Westminster and Fulham, which was laid in 1882. During the following year, an amalgamation with the London Gas Company was effected, and twenty years was the 36-in. main laid to Stoke Newington valve-room in 1892. This appears to be the first branch of the system laid to supply a new distributing centre in a developing part of the area. The previous extensions were all made in order to link up manufacturing stations,


THE GAS LIGHT AND COKE COMPANY.
THE BECKTON MAINS SYSTEM - 1901 - 1915
Plan No. 3
SCALE OF MILES
REFERENCE
Mains existing up to & including 1900 shewn thus
Mains laid during period shewn thus
Governors shewn thus
Manufacturing Stations shewn thus
Holder Stations shewn thus
Distributing Central Centre (Goswell Road) shewn thus
Note Additional areas shewn hatched
KEY MAP OF GROWTH OF COMPANY

their works at Nine Elms and holder station at Battersea were connected to the Beckton system by a part 30-in., part 24-in. main in 1884 or 1885. This branch was laid, as a district main, about 1865, and was converted to high pressure in order to link up with the 36-in. main referred to above. In the same years (1884-85), a 48-in. branch was laid from the existing 48-in. main near Goswell Road to Horseferry Road, it being considered that the 36-in. main was insufficient to meet the additional load imposed by the linking-up of Fulham and Nine Elms Works.

The only other extension of the system during this

although, later, manufacture was discontinued, and in several cases only the governor houses remained.

1901-1915.

No further additions to the Beckton mains system were made until 1910, when, after the amalgamation with the

West Ham Gas Company, who had works at Stratford and a holder station at East Ham, a 24-in. main was laid to connect this holder to Beckton. The following year this main was extended in 18-in. diameter to connect up with the works of the Barking Gas Company and the works of the Chigwell, Loughton, and Woodford Company, both of which companies were absorbed in 1912. Both the Barking and Woodford works were shut down (the holders and governors being retained), and the whole supply to these areas was provided from Beckton.

These extensions are shown by broken lines on Plan No. 3.

1916-1923.

Plan No. 4 covers the period 1916-1923. During the war period, it was not possible to carry out any large mains extensions, but the building of aircraft factories and other munition works caused considerable increases in the demand for gas in that part of the area supplied from Kensal Green Works, and these were met temporarily by the installation of several boosters on the district mains. Since these factories had also necessitated the building of a number of houses in their vicinity, steps were taken as soon as the war was over to reinforce the supply to Cricklewood and the district north thereof by means of high-pressure mains.

This work was commenced in 1919, a 24-in. main being laid from Kensal Green Works to Cricklewood with an 18-in. branch to Harlesden and a 12-in. extension to Golders Green, underground governors being installed at the end of each section. These mains formed the beginning of an extensive system which, owing to the great development of the area, has had to be rapidly enlarged during the past ten years. The system is supplied by pumps at Kensal Green Works and is not strictly part of the Beckton system. The pressures worked are, however, within the same range as those worked on that system, and for convenience it is proposed to include a description of the system in this part of the paper.

In 1922, it was found necessary to provide a further supply for the Golders Green district, and a 14-in. main between Cricklewood and Childs Hill was converted to high pressure and connected to the 24-in. main at Cricklewood.

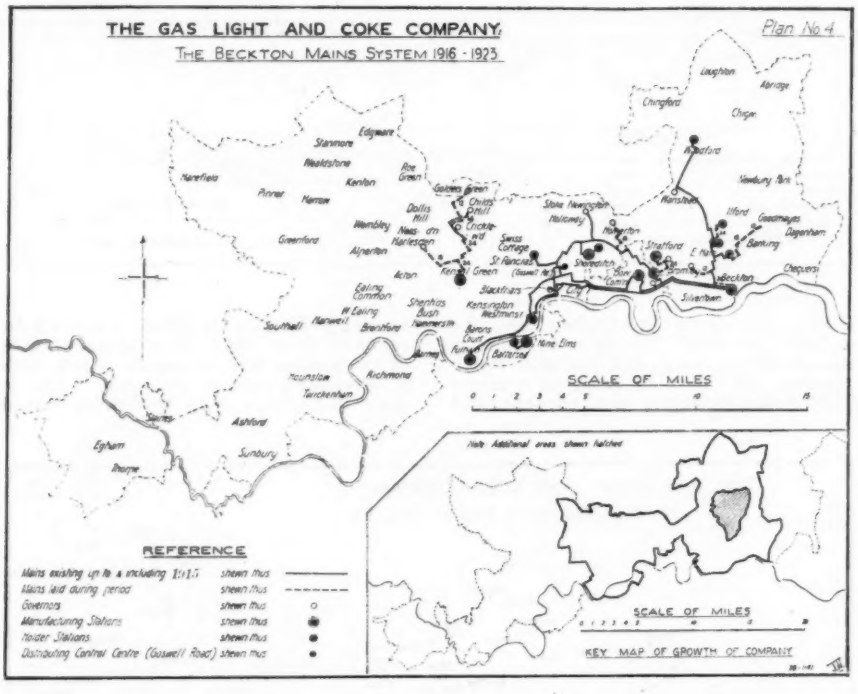
The other mains extensions carried out during this period were all on the eastern part of the area. Three of these—viz., a 12-in. main from Manor Way, Beckton, to East Ham, an 18-in. main to Homerton, and an 18-in. main from Barking to Goodmayes were feeder mains, reinforcing the district mains through governors.

A 24-in. main was laid in 1920-22 to connect Stratford Works to Bromley and thence to the general Beckton system, while in 1922, following the absorption of the Ilford Company, a 24-in. main was laid between the Ilford Works and the East Ham Holder Station. The laying of this main enabled the Ilford Works to be closed, only the holder and governors being retained in action.

With the increasing load on the 24-in. main from Beckton to East Ham, due to the steady development on the eastern area and the addition of the Ilford district, it was found necessary to work higher pressures on that main than were required on the 48-in. mains to the City. New pumps were therefore installed in No. 2 Distributing Station at Beckton to feed the eastern part of the system, and this Station was separated from the No. 1 Distributing Station which supplies the 48-in. mains. A short length of 24-in. main was laid from No. 2 Distributing Station to connect to the East Ham main.

1924-1925.

During 1924 and 1925, the Kensal Green system was considerably extended, an 18-in. main being laid from Cricklewood to Dollis Hill and connected to a short length of 14-in. low-pressure main which was then converted to high pressure. From the west end of this 14-in. main at Neasden, a part 18-in., part 14-in. main was laid northwards to Burnt Oak, just south of Edgware. Governors were installed at Dollis Hill and two other points on this main, as indicated on Plan No. 5.


THE GAS LIGHT AND COKE COMPANY.
THE BECKTON MAINS SYSTEM 1916 - 1923
Plan No 4
SCALE OF MILES
REFERENCE
Mains existing up to & including 1915 shewn thus
Mains laid during period shewn thus
Governors shewn thus
Manufacturing Stations shewn thus
Holder Stations shewn thus
Distributing Control Centre (Gaswell Road) shewn thus
Note Additional areas shewn hatched
SCALE OF MILES
KEY MAP OF GROWTH OF COMPANY

During this period, a 36-in. main connecting Kensal Green Works to the Beckton system at Fulham was laid, thus linking up this works which had remained isolated from the system for over 50 years, and a governor fed by this main was installed at Addison Gardens, Kensington. On the eastern part of the area, an 18-in. main to Silvertown was converted to high pressure, and two governors were installed to maintain pressures for the numerous factories in that area.

On Plan No. 5 are also shown the high-pressure mains on the Brentford Company's area. These consisted of a 30-in. main from Southall Works to Ealing, a 30-in. main from Southall Works to Brentford Works, and an 18-in. branch from the latter, at West Ealing, to Alperton. These mains were supplied by boosters working up to about 20-in. pressure at Southall. The Southall-Ealing main was extended to Shepherds Bush by a 26-in. main. Several small connections between Southall and Ealing were supplied through governors; but there was no governor on the end of the main, pressures at Southall being adjusted to maintain adequate pressures at Shepherds Bush by the aid of a Widlake distant pressure indicator. There was a governor house at West Ealing, supplied from the Southall-Brentford main.

(To be continued.)

Institution of Chemical Engineers

ANNUAL CORPORATE MEETING

The Institution of Chemical Engineers held their Tenth Annual Corporate Meeting at the Hotel Victoria, Northumberland Avenue, London, W.C., on Friday, Feb. 19—the President, Mr. W. A. S. CALDER, in the Chair.

TRIBUTES TO THE LATE PROF. HINCHLEY AND SIR ARTHUR DUCKHAM.

The PRESIDENT, at the opening of the meeting, said that since the members had last met, fate had swung a heavy scythe, for they had lost the Institution's Hon. Secretary, John William Hinchley, to whom they had already paid proud tribute, and, within the last few days, they had lost their first President—Arthur Duckham. As Birdwood had been known during the war as "The Soul of Anzac," so to many who were at home at that time Duckham was "The Soul of Whitehall." They had looked forward to his too infrequent visits. The deeper the gloom, the greater was his cheer; whatever trouble there was, he was always willing and anxious to help. He had made no carping criticism of what had been done in the intervals; the line he had taken was to express astonishment that so much could have been accomplished, and in that way he had certainly got the best possible out of those with whom he had come into contact. He was a man of whom it might have been said, "If in the paths of the world stones might have wounded thy feet, toil and dejection have tried thy spirit, of this we saw nothing; to us thou wert still helpful and cheerful and firm." The President expressed on behalf of the Institution the deepest sympathy with Lady Duckham and her family.

THE INSTITUTION'S HON. SECRETARY.

The PRESIDENT introduced to the meeting the Institution's new Hon. Secretary, Mr. H. W. Cremer (Director of Chemical Engineering Studies at King's College, London), and, as one who had had the privilege of working with Mr. Cremer during the war, said that the Institution had done the right thing in electing him.

Mr. CREMER was received with applause, and, after expressing his appreciation of the honour done him, paid a tribute to his predecessor, the late Prof. Hinchley, who had played so prominent a part in the development of the Institution since its incorporation in 1922.

ANNUAL REPORT OF THE COUNCIL.

The HON. SECRETARY presented the Council's Report for the past year. With regard to membership, he said, the net increase during 1931 totalled 39, bringing the total to exactly 700, which was very satisfactory for so young an Institution, particularly having regard to the fact that it was a qualifying body, which necessarily tended to restrict membership.

The report acknowledged the whole-hearted service rendered by the late Prof. Hinchley to the Institution during the entire period of its existence. A special commemorative number of the Institution Bulletin was issued in December, and arrangements have been made, in conjunction with Mrs. Hinchley, for the erection of a Memorial at Golders Green. Mr. Cremer added that, as had been expected, there was a very keen desire on the part of members to participate in that memorial, and the arrangements were well advanced.

With regard to education, he said that, chiefly as the result of the discussion initiated at the last annual corporate meeting by Mr. J. Arthur Reavell, on the education and training of the chemical engineer, the Education Committee had paid special attention to this matter. It was fortunate in having Sir Frederic Nathan as Chairman of the Committee; under his able direction much progress had been made. It was very satisfactory to record the number of inquiries received concerning the training and experience necessary for membership of the Institution; it was to be hoped that in time more provincial teaching institutions would provide facilities for the necessary training. The fact that the number of examination candidates was increasing was another hopeful sign, and it was very satisfactory to have the testimony of past candidates as to the valuable experience they had gained by sitting for the Institution's examination.

Reference was made in the report to the splendid progress which had been effected at University College, London, where the new building for the Ramsay Memorial Laboratory of Chemical Engineering was recently opened by H.R.H. Prince George. Prof. Gibbs and his colleagues must feel well satisfied with the results of their very strenuous labours in connection with the extension and reorganization of their Department.

A tribute was paid to Mr. S. G. M. Ure (Hon. Editor), Mr. T. Campbell Finlayson (Hon. Librarian), and Mr. H. J. Pooley (Director of the Appointments Bureau). The Bureau had experienced a year of great difficulty, and that had been met by record efforts on the part of Mr. Pooley, with encouraging results. (It was stated in the report that, notwithstanding the depression, a number of useful appointments had been arranged, and except for inability to satisfy the requirements of three important positions overseas where oil mining experience was necessary, the proportion of successful appointments secured was again very high. It was satisfactory to report again the frequency with which employers whose requirements had previously been satisfied by the Bureau returned to that source when vacancies occurred.)

Mr. Cremer made particular reference to the progress of the Graduates' and Students' Section of the Institution, which was run on very business-like lines and contained some of the keenest spirits in the Institution. It was very gratifying that such a keen body of young men was available to carry on the work of the Institution in later years.

The proposed visit of the American Institute of Chemical Engineers to this country which was to have occurred this year had been postponed by mutual consent until a more favourable time, and it was hoped that it might be found possible to hold the joint meeting in 1934.

The Council expressed its grateful thanks to Mrs. Hinchley for the presentation of three portraits which the late Hon. Secretary had wished to become the property of the Institution. The subjects were Sir William Ramsay, Sir Hugh Myddelton (a portrait by Mrs. Hinchley after Jansen), and Lord Moulton.

It was satisfactory to record the increasing representation of the Institution on Committees and at meetings of other organizations both at home and abroad. The responsibilities of the various standing Committees tended to increase, naturally, with the growth of the Institution, and the Council desired to thank the members of these committees for their help. Mr. Cremer paid a special personal tribute to the work of the Assistant Secretary (Mr. C. J. T. Mackie) and the other members of the staff.

THE ACCOUNTS.

Mr. F. A. GREENE (Hon. Treasurer) presented the accounts for 1931. In a reference to the Institution's Benevolent Fund he said it had increased, but the Council was very anxious indeed to increase it further, in view of the industrial depression.

The report and accounts were adopted.

OFFICERS AND COUNCIL.

The Officers and Members of Council elected for the ensuing year, as the result of the ballot, were as follows:

President.—The Rt. Hon. Viscount Leverhulme.
Vice-Presidents.—Mr. Geo. Gray, Dr. W. H. Hatfield.
Hon. Secretary.—Mr. H. W. Cremer.
Hon. Treasurer.—Mr. F. A. Greene.
Members of Council.—Prof. W. E. Gibbs, Mr. W. MacNab, Mr. P. Parrish, Mr. F. H. Rogers, and Mr. W. D. Graddon (Assoc. Member).

Lord LEVERHULME, expressing his thanks for the honour of being elected to the Presidency, said he seemed to have been a truly National candidate, for no other party had put anyone forward in opposition. [Laughter.] It was really a great compliment, not only to himself, but also to the firm and the industry he represented.

He had suggested that it would be to the benefit of the Institution if, during his year of office, it should have the assistance of Mr. Calder as Chairman of the Council, and Mr. Calder had very kindly consented to carry out those duties.

DISTRIBUTION OF MEDALS.

The RETIRING PRESIDENT (Mr. Calder) then presented Medals and Certificates for 1931 to the following:

The Osborne Reynolds Medal (for the most meritorious service for the advancement of the Institution during the year) to Mr. H. Talbot.

The Moulton Medal, to Mr. N. E. Rambush and Mr. F. F. Rixon, M.Sc., A.R.C.S., D.I.C., for a paper on "The Gas Generator as a Direct Producer of Metallurgical Products."

The Junior Moulton Medal and prize of books to Mr. M. L. Nathan, B.A., for his "Report on High-Temperature Heat Insulation; a Correlation of Existing Data."

Votes of Thanks.

Hearty votes of thanks were accorded to the retiring President and to the other Hon. Officers and Members of Council for their services to the Institution.

International Congress on Chemical Engineering.

Sir Frederic Nathan gave some particulars of the arrangements which are being made with a view to holding an international congress on chemical engineering. A small Committee had been formed to consider the matter from all points of view, and had asked him to get into touch with the Chairman of the World Power Congress in order to enlist the support of that organization. The Chairman of the World Power Congress had been very enthusiastic, and had promised the support of his organization in every possible way. The position reached was that the Institution of Chemical Engineers and the World Power Congress had appointed representatives, who were actively engaged in considering the scheme in detail. It was anticipated that an international congress on chemical engineering would be held in the year 1934. It was hoped that this would do a great deal to further the science and the profession of chemical engineering in this country.

Presidential Address.

Mr. Calder, in his Presidential Address, dealt with the subject of "The Control of Industry." A system of control, he said, broadly included (1) control of the actual detailed operations; (2) control and direction of personnel; (3) controlling supplies of necessary materials; (4) obtaining the necessary markets; (5) improving present processes and developing new ideas by research; (6) design, construction, and maintenance of output of plant; (7) recording the doings of all departments, and costing; (8) providing and safeguarding the sinews of war.

In this country they had a class of workmen second to none for skill, devotion to their duties, and, above all, their appreciation of efficient higher control. Such efficient higher control obviously included a sympathetic understanding of their needs and difficulties, and regarded their protection from unnecessary risks as one of its primary functions. There was nothing, in his opinion, more calculated to secure a feeling of contentment than that all employed should feel that a policy of an "ever-open door" for suggestion or complaint was at their disposal. His personal experience was that there was not the slightest risk of this privilege being abused, and that the knowledge of its existence tended to prevent the possibility, except in very rare circumstances, of there being any necessity for its use. As the size of the establishment increased, the obvious difficulty of such a course of direct appeal became greater, but this did not mean that there was no possible solution of the problem. The feeling that the man in supreme command was insistent on every one being given a square deal and had provided suitable channels for obtaining information of any individual hardship, could and did create a feeling of loyal confidence in all ranks, and of contentment. In this connection, the President did not wish it to be inferred that all grumbling would be prevented. As a nation, he said, we had a special gift of appreciating to the utmost the disadvantages of any system with which we are connected.

Much good might be done by adequate provision for sport and social recreation, but in this connection wise moderation was the keynote.

The handling and protection of the operatives in large establishments obviously demanded a Labour Department. Such a Department, to secure full success, must constitute an integral portion of the works management. The President added that he had comparatively lately become a convert to the Works Council system. Adequate representation of the workers themselves, with full rights to air their views freely, was one of the most essential parts of a works council, and the management, if wise, made no attempt to do other than lead the members along the right broad general lines and to confine the scope of the Council's activities within due bounds.

The question of safety was of such paramount importance that the full sympathy and co-operation of the Council should be ensured by the use of Safety Sub-Committees. Coming to the somewhat vexed question of the desirable extent of State control of industry, he said that many of us were at one time disposed to swell the chorus of "hands off industry." Experience, however, had taught us that, properly administered, there was a distinct advantage in some measure of State control. There were some Departments, one of which was the Alkali Works Inspection Department of the Ministry of Health, which had so far won the confidence and regard of their victims that many of them would nowadays fight, were it necessary, for their retention.

TENTH ANNUAL DINNER.

In the evening, with the President (Mr. W. A. S. Calder) in the chair, a company of about 250 members, ladies, and guests sat down to the Tenth Annual Dinner at the Hotel Victoria, where a delightful evening was spent. The speeches were unusually good, and there was an excellent programme of music for which the Kensington Singers were responsible.

The principal guest was Sir Harry McGowan, K.B.E. (Chairman of Imperial Chemical Industries), who proposed "The Institution of Chemical Engineers." He said that when the Institution was formed its founders had great expectations of it, and these expectations were not ill-founded. Just past its ninth birthday, the Institution now had a membership of over 700, and with this increasing membership had come increased responsibility and increased usefulness. There were few activities which did not call for the services of the chemical engineer. Up to the present, the road of the chemical engineer had been no easy one. He had been regarded somewhat dubiously by both engineer and chemist. The past year, continued Sir Harry, had been one which few could contemplate with satisfaction, but very important developments had been taking place during the last few months. In September last, when we went off the gold standard, the position was much more serious than the man in the street knew of, but we all hoped and believed that by the change in our fiscal arrangements a new era of prosperity had opened for our country. He felt very strongly that the dawn was breaking, because the Company of which he had the honour to be Chairman might be looked upon as a barometer in regard to certain heavy industries, and he was pleased to say that their sales of heavy chemicals for the first six weeks of this year showed advances varying from 10 to 20 p.ct. over the corresponding period of last year. A great work was awaiting the chemical engineer, and they must see to it that this work was brought to fruition.

The President, replying, said the ambition of the Institution was to gain experience and retain its youthful ideals and resolutions. The continually widening field open to the chemical engineer in the discovery of new materials for plant construction, and the selection of the most suitable materials for any special purpose, and the necessary modifications of plant design, furnished sufficient scope to justify the chemical engineer.

It had not been his intention, continued the President, to allude to any gaps in their ranks on this occasion, but he was bound to refer to the recent death of Sir Arthur Duckham, the first President of the Institution, and to offer sympathy to Lady Duckham and the family. Also, the wife of their first Hon. Secretary was absent for the first time at these gatherings owing to the death of Prof. Hinchley.

Lord Leverhulme proposed "Our Guests," to which Sir John Cadman made the first response—expressing his conviction that the combination of chemistry and engineering in the chemical engineer was a most important link in the development of the great industries of the country, and it would add to the capacity of this country to carry out its functions as a great industrial nation. If to that combination were added biology, and we had a chemical-engineering-biological structure—because this brought in the human element—then something much greater and grander would come to this country.

Lieut.-Col. W. H. Hatchard-Smith also briefly responded.

Mr. J. Arthur Reavell proposing the toast of "The President" spoke of the valuable work he had done for the chemical engineering profession, and of the human touch he had brought into it.

The President, responding, said he could not have carried on the work of the Institution but for the generous help given to him by the members of Council, and the very efficient work of Mr. C. J. T. Mackie (the Assistant Secretary) and the staff.

Belt Conveyors

By A. WHITEHOUSE, of Birmingham.

[From a Paper read before the Midland Junior Gas Association on Thursday, Feb. 4]

This paper is intended to deal chiefly with the conveyance of gas-works coke, and it is proposed only to deal with the type of belt most suitable for that material.

If the conveyor is to work in the open air, carrying wet material, or materials containing destructive acids, there is no argument against a rubber covered belt. Generally speaking, a low-priced belt is false economy, and it is worthy of note that the most expensive makes retain their market.

Conveyor belt failures come usually under three headings:

(1) Wearing so thin that it is not safe to run them any longer.
(2) General break up through lack of adhesion to bind the layers of canvas together.
(3) Bad treatment of the belt, generally at the edges, through excessive use of guide idlers. This is often done to overcome bad alignment of the wearing parts, and it causes stripping of the rubber cover which allows moisture to enter and attack the fabric.

A careful examination of a sample of rubber belting should be made before making a selection and engineers should specify somewhat as follows:

Duck.—The duck should be woven to permit of transverse flexibility—a duck weighing 28 oz. per piece 36 in. by 42 in. in size is quite suitable for a coke belt, but for heavier materials such as coal and iron ore a heavier duck is preferable (say, 32 oz. or even 36 oz.). The longitudinal breaking strength of the cotton must not be less than 350 lbs. per in. width of ply. This means that the ultimate breaking strength of a 24 in. with 4 plies will be:

$$\frac{350 \times 24 \times 4}{2240} = 15 \text{ tons.}$$

The elongation of the cotton is between 23 p.ct. and 25 p.ct.

Rubber Cover.—The tensile strength of the rubber cover should be 4000 lbs. per sq. in., with an elongation of 550 p.ct.

Frictioning.—The friction test between the plies is that the plies will not separate at a greater rate than 1 in. per minute, with a 23-lb. weight suspended to 1 in. of cotton.

Construction.—The duck is folded up, each ply being folded over itself once with the seams of cotton in a position where they will not come into line with the joining of two idler rollers.

Belts up to 550 ft. are made without transverse joints.

Belts are vulcanized under tension to ensure straight running, and to prevent stretching when in operation. Edge construction is made by bringing the top cover 1 in. to the underside of the belt, to ensure that there is no seam at the edge.

A rough comparison of the quality of the rubber used in belts submitted for the purchasers' choice may readily be made by cutting, with a sharp knife, a strip of the top face $\frac{1}{4}$ in. wide, and, say, 6 in. long. This strip can be pulled away from the cotton, and note should be made of the adhesion. The rubber strip may then be elongated, say, three times its length, and relaxed. It should then be re-measured and a note taken of the amount of permanent stretch that has taken place. Such a test will go a long way towards convincing the engineer that his choice is a correct one.

It must be borne in mind that belts are not only subject to wear, but also to tensile stresses due to the load carried, and the latter condition affects the thickness of the belt, thus determining the number of plies and the weight of the duck to be used.

Resistance to wear depends entirely on the rubber cover which protects the stress members—viz., the plies of duck. Adhesion between the cover and the duck is of vital importance to enable all parts of the belt to act as one unit. If the adhesion is not complete, the following might be expected:

(1) Internally destructive stresses are set up, thereby weakening the cover as well as the duck.
(2) Resistance of the belt against stresses in bending around pulleys is weakened; for instance, if the cover becomes separated from the duck, the edges may curl over and crease, eventually forming a crack.

The ply of a belt can readily be obtained from the following formula:

$$T = \frac{P \times F}{W \times S}, \text{ in which}$$

T = No. of plies.
P = Horse power pull.
F = a factor dependent on the type of driving pulley.

2 for single bare pulley
$1\frac{1}{2}$,, ,, lagged ,,
$1\frac{1}{3}$,, tandem ,, ,,

W = width of belt in inches.
S = allowable working stress of belt variable for different weights of duck =

20 lbs. for 28 oz. duck
23 ,, ,, 32 ,, ,,
28 ,, ,, 36 ,, ,,

The H.P. pull must be determined, and this can usually be obtained from manufacturers' catalogues or various engineers' handbooks.

In the foregoing formula, the point regarding allowable working stress is important, because the manufacturer might offer 28 oz. of duck where 32 oz. should be used, and the formula might prove that the belt is too thin.

The following table will serve as a guide for the minimum number of plies:

Belts 16 to 20 wide inclusive = 4 plies
,, 24 to 30 ,, ,, = 5 ,,
,, 36 to 48 ,, ,, = 6 ,,
,, 48 to 60 ,, ,, = 7 ,,

Hot coke can be handled up to 250° Fahr. if the highest grade of rubber compound is obtained. Above this temperature a special heat resisting compound is introduced in the form of an asbestos liner under the top cover of the belt.

TONNAGE LIFE OF BELTS.

No definite rule can be given to determine the life of belts owing to the varying conditions under which they are used, but an approximate tonnage which is not the limit of the performance of a good belt may readily be determined for a good grade of rubber cover $\frac{1}{4}$ in. thick on a conveyor 100 ft. long, and conveying 50 lbs. per c.ft. of material. This is done by assuming a tonnage equal to 567 times the square of the width of the belt in inches, so that a 30-in. belt would carry during its life $567 \times 30^2 = 510{,}300$ tons of coal. Assuming a tonnage of 50 tons per hour for 300 days per year and 8 hours per day, then

$$\frac{510{,}300}{50 \times 300 \times 8} = 4 \text{ years } 3 \text{ months.}$$

A belt 200 ft. long should last the life of 100 ft. conveyor × $1\frac{1}{2}$ = 5 years 3 months.
A belt 300 ft. long should last the life of 100 ft. conveyor × $1\frac{1}{2}$ = 6 years $4\frac{1}{2}$ months.
A belt 400 ft. long should last the life of 100 ft. conveyor × $1\frac{3}{4}$ = 7 years 6 months.
A belt 500 ft. long should last the life of 100 ft. conveyor × 2 = 8 years 6 months.

It must be emphasized that this is only an approximation, which appears to be reasonable according to actual observation.

It is not advisable where it can be avoided to exceed 500 ft. length of conveyor, and where necessary it can usually be arranged to split the conveyor into two or more sections, although this, of course, will result in a certain loss of headroom.

POWER REQUIRED.

Conveyors are usually driven by means of electric motors through suitable reduction gears, and although there is undoubtedly some loss of efficiency through worm reduction gears, yet, owing to the gritty condition of the atmosphere on coke plants, it is advisable to use a good make of totally enclosed worm reduction gear. This particularly applies when the conveyor is fixed at an angle, as there is then no danger of the belt running backwards.

The following formula will give the B.H.P. required for driving conveyors having ordinary plain bearing idlers, taking into consideration the necessary power required for starting up a fully loaded belt so that the B.H.P. will be the maximum and not the average.

When working horizontally,

$$\text{H.P.} = \frac{(\text{W.S.} + 22.\text{T})\ \text{L.}}{280{,}000}$$

Where W = Width of belt in inches.
S = Speed in feet per minute.
T = Tons conveyed per hour.
L = Length of conveyor in feet.

Example.—A conveyor 24 in. wide running at 300 ft. per

min. and conveying 108 tons of coal over a distance of 100 ft.

$$\text{H.P.} = \frac{(24 \times 300 + 22 \times 108)}{280{,}000} \times 100 = 3{\cdot}42 \text{ B.H.P.}$$

The B.H.P. required for inclined conveyors is obtained from the following formula:

$$\text{H P.} = \frac{(\text{W.S.} + 22.\text{T})\ \text{L.} + (30\ \text{H.T.})}{280{,}000}$$

Where H = the height the load is elevated in inches so that if the above conveyor is elevated 10 ft.

$$\text{H.P.} = \frac{(24 \times 300 + 22 \times 108)\ 100 + (30 \times 10 \times 12 \times 108)}{280{,}000} = 4{\cdot}8 \text{ H.P.}$$

These results may be divided by $1\frac{1}{2}$ if the conveyor is fitted throughout with ball-bearing idlers.

Capacity of Conveyors.

The capacity of a conveyor is dependent entirely upon the cross-sectional area of the material when lying in the troughed idler, and, using a 3-pulley idler, with the side pulleys set at an angle of 30° with the horizontal, which is usual in ordinary cases, the area of section in square feet = $0{\cdot}000583.W^2$ when W = the width of the belt in inches.

This formula allows a generous margin of unfilled belt in order to prevent any danger from spilling the material. The capacity when running at 100 ft. per minute may be obtained from the formula

$$\text{C.Ft. per hour} = 3{\cdot}5\ W^2.$$

this is proportional to the actual speed of the belt.

The actual capacity of belt conveyors of all sizes and speeds and for all kinds of materials can readily be obtained from the above formula, and there is no need to elaborate them further.

Inclination of Conveyors.

Conveyors, when used for coke-handling, may be arranged with an inclination not exceeding 16° with the horizontal when using screened coke or breeze. If this elevation is exceeded, there is a tendency for round pieces of coke to roll back against the direction of the conveyor.

If, however, mixed or unscreened coke is being handled, the elevation may be arranged up to 22° with the horizontal, and, in some few cases, where fine materials, such as sand, slack, &c., are handled, the angle may be as high as 25° with the horizontal.

Costs.

Below will be found a table giving approximate costs of ordinary conveyors in terms of price per foot. These costs do not include the motors and gears; nor is anything allowed for supporting structures which vary according to circumstances.

It will be noticed that the longer the conveyor, the cheaper the price per foot, which is accounted for by the fact that the head and tail terminals will cost the same for a short conveyor as for a long one.

Approximate Costs of Belt Conveyors fitted with Ball Bearing Idlers.

Costs per Foot of Conveyors.

Size of Conveyor.	100 Ft. Centres.	200 Ft. Centres.	300 Ft. Centres.	400 Ft. Centres.	500 Ft. Centres.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
18 in. × 4 ply belt.	2 0 0	1 12 0	1 9 0	1 8 0	1 7 0
24 in. × 5 ,, ,,	2 10 0	1 18 0	1 15 6	1 13 9	1 13 0
30 in. × 5 ,, ,,	2 18 0	2 5 6	2 1 6	1 19 6	1 18 6
36 in. × 6 ,, ,,	3 11 0	2 16 0	2 12 0	2 10 6	2 8 0

The ratio between the cost of the conveyors complete and the rubber and canvas belts only in the before-mentioned cases is as follows:

Size of Conveyor	100 Ft. Centres.	200 Ft. Centres.	300 Ft. Centres.	400 Ft. Centres.	500 Ft. Centres.
18 in. × 4 ply belt.	5·00 : 1	4·14 : 1	3·85 : 1	3·62 : 1	3·58 : 1
24 in. × 5 ,, ,,	4·75 : 1	3·65 : 1	3·34 : 1	3·2 : 1	3·12 : 1
30 in. × 5 ,, ,,	4·3 : 1	3·45 : 1	3·15 : 1	3·1 : 1	2·94 : 1
36 in. × 6 ,, ,,	3·54 : 1	2·9 : 1	2·67 : 1	2·62 : 1	2·5 : 1

In conclusion, the belt conveyor, within its limitations, transcends all its rivals, both for simplicity of construction, economy in first costs, and general upkeep. Practically the only wearing part is the belt itself, and as will be seen, the life of the belt is so considerable, and the total tonnage it will handle during that life is so large, that a belt belonging, say, to a 100 ft. conveyor 30 in. wide, carrying 510,300 tons of coal, or approximately 250,000 tons of coke, during its life, will cost about £70 to install with a cost per ton of only 0·067d. for coke and 0·033d. for coal. Furthermore, its utility for handling both coal and coke on gas-works is now firmly established, and the ability of a good rubber to withstand the abrasive action of coke makes it particularly attractive when the latter has to be handled.

Discussion.

The President (Mr. W. L. S. Spinks, Birmingham) congratulated Mr. Whitehouse upon his paper, which he said was distinctive on account of the large amount of data it contained. This information should be very useful to junior engineers when dealing with problems in connection with transport in gas-works practice. The fact that Mr. Whitehouse had been able to give a comprehensive paper on the subject of belt conveyors, which was only a small phase of the subject of transport, showed how important the whole subject was.

Mr. L. H. Thomas (Smethwick), a Past-President, in proposing a vote of thanks to the author, said the belt conveying method was rapidly becoming one of the chief ways of handling gas-works materials. The value of such conveyors lay largely in the fact that comparatively little breakage was occasioned to the coke. The author mentioned that conveyors, when used for coke-handling, might be arranged with an inclination not exceeding 16° with the horizontal, when using screen coke or breeze. He would like to know whether he had had any experience with an inclination at a higher figure. He was interested, he said, in the methods adopted for the lubrication of idlers with an almost complete absence of coke dust. The conveying of oxide was now receiving more attention at many gas-works, and he would like to know whether Mr. Whitehouse had any experience in this direction, and whether he had found that any trouble arose in consequence of the sticking of the wet oxide.

The resolution was seconded by Mr. S. K. Hawthorn (Birmingham), who commented upon the efficiency of transporting coke by the belt conveyors. He would like to know if materials other than those of canvas and rubber had been used in the making of band conveyors, and, if so, the reasons for their rejection.

Mr. H. C. Wills (Birmingham) inquired if experiments had been made by placing cross-pieces of some flexible material across the belt with a view to checking or preventing friction.

Mr. A. St. D. Corder asked for information as to the speeds at which conveyor belts could be run in ordinary works practice.

Mr. V. O. Albutt (Birmingham) asked for some explanation for short length belts having a life of shorter duration than very long belts. He realized, of course, that there was considerable wear at the turnover pulleys. It seemed to him that very great care should be taken in the choice of a belt, and that a duck of the more flexible type had real advantages. He would like to have more detailed information as to the minimum diameter of the belts having regard to the pulleys and the material that was to be handled.

Mr. W. Macnaughton (Wolverhampton) spoke of the difficulty of keeping coke dust off the idlers, and asked for information as to the most efficient conveyors for dealing with oxide.

Mr. Wills referred to the question of the spacing of the idlers, and inquired if any particular form of spacing could be advocated, because he recognized that there was a flattening-out between the idlers and then a contraction as the belt reached them.

Other questions were asked, and one speaker commented upon the fact that the life of cast-iron idlers was comparatively short.

The vote of thanks was warmly approved.

Mr. Whitehouse, in reply, said the reason he had dealt with the subject of handling gas-works material was because it was one which had been rather neglected in favour of the more obvious question of providing gas to the consumer. In these days of progress and fierce competition it seemed to him that gas undertakings, however small, should do everything possible to effect reductions in handling costs. He hoped that his contribution might be of some service to draughtsmen and assistant engineers who were directly concerned with gas production. Everything should be done to prevent what had been called the "bouncing" of the coke. A belt should be designed at such an angle that the material would flow on to the belt at the speed with which the belt would take it along. It was a good plan to fix a skirting board at the point of delivery, and this should be extended for a distance of 6 or 7 ft. He had made experiments on the subject of the inclination of conveyors in relation to the transport of breeze, and he found that above 16° there was a distinct tendency for the material to roll, particularly when it came through fairly dry. Speaking generally, it was not, in his opinion, desirable to exceed 16°.

He had not had much experience of conveying oxide, but in that experience there was no difficulty in consequence of the sticking of the material. The conveyor which carried the oxide was rather steep. It was generally considered that for 2-in. material as a maximum a 14-in. belt would be sufficiently wide. An 18-in. belt would take up to 3 in., and the ratio of measurement could be continued accordingly. If, however, the material was not well graded the belt sizes could be increased. In his own experience he found that when working with wet coke the belt fasteners showed a tendency to corrode. It was therefore necessary carefully to watch these fasteners, and to overcome possible difficulties a thin strip of rubber was stuck on to the belt over the fastener. By this means the life of the latter was materially prolonged. As to the suggestion of the use of cross-bands in order to permit of an increase in the inclination, Mr. Whitehouse said that method had been tried, but it was not to be recommended where the material transported was wet coke. It would not be easy to secure the cross-strips.

Respecting the speed at which belts should travel, he pointed out that this was regulated largely by the kind of material that was being carried, and also upon the question of the amount of breakage allowed in discharging. As a general principle the speed of a belt should be as low as possible with a full load. The result of excessive speed was a scattering of the material thinly over the belt. The stretch of a belt depended almost invariably on the quality of the material of which it was made, and the common experience was that the stretch was the greater with a low price belt.

He was not aware of a belt that had extra thick rubber in the centre, and it seemed to him that if there were such belts there would be difficulty in using them advantageously in ordinary gas-works practice. Regarding the life of a long belt as compared with a short one, he pointed out that the bulk of the wear took place near the point of delivery. He agreed that in the case of cast-iron idlers the wear was particularly heavy on the return idlers, because they came more in contact with grit. That explained why manufacturers had introduced the wrought-iron type for the return idlers. As to the spacing of the idlers the general practice was to do this evenly between the head and tail pulleys, the return idlers having double the spacing. There were, of course, belts of types other than those of rubber and canvas, but for the kind of work required in gas-works the latter seemed to be the most effective. Some of the other types of belts were extremely serviceable where the loads consisted either of non-abrasive or comparatively light materials.

Manchester and District Junior Gas Association

Visit to Preston (Lostock Hall) Gas-Works

On Feb. 6 the Association visited the new works of the Preston Gas Company, built on a site of some 32 acres, and directly connected with the L.M. & S. Railway. They were received at the works entrance by Mr. W. L. Heald, Assistant Engineer and Manager, in the unavoidable absence of the Engineer, Mr. S. Tagg. Mr. Heald, together with the members of the technical staff, conducted the parties around the works. [A full description of the works will be found in the "JOURNAL" for Oct. 14, 1931.]

H. B. KNOWLES, Assoc.M.Inst.Gas E.

Mr. H. B. Knowles, who is Chief Assistant Engineer and Manager at the Lancaster Corporation Gas-Works, was articled for four years (1911-15) with the Gas Engineer at Darwen, after which he became Chief Assistant Engineer and Manager to that undertaking. In 1917 he was with the Barnsley Smokeless Fuel Company, and the following year he became Chief Chemist and Assistant to Messrs. Saml. Fox & Co., Coke Oven and Bye-Products Company, of Stocksbridge. In 1920 Mr. Knowles received the appointment of Assistant Engineer and Manager to the Nuneaton Gas Company, a position he held for a year before obtaining the appointment he now occupies.

After the tour of inspection, tea was served in the works canteen. At the call of the President, Mr. H. B. Knowles, Mr. W. Hill (Stalybridge) moved, and Mr. H. Platt (Bolton) seconded, a vote of thanks to the Directors, Mr. Tagg, and the technical staff for their hearty welcome and hospitality.

Mr. Heald, in reply, expressed the regrets of Mr. Tagg's inability to be present. He thought that few men had had the experience of building an entirely new works on virgin soil. During his own time, however, he had assisted at no fewer than four new works. The new works has cost £285,000, and there was some further work to be done.

THE INDUSTRIAL GAS PROBLEM.

By GORDON H. F. WINDIATE, A.M.C.T., Technical Assistant, Stretford and District Gas Board.

[EXTRACT.]

There is no doubt that the future of the Gas Industry lies in its "industrial load," since gas can be applied, directly or indirectly, to any heating operation whatsoever.

Solid fuel fired furnaces can lay very little claim to any degree of control, such as may gas, oil, or electricity. In the case of the last three fuels, control is so bound up with consistency in supply that it can hardly be considered apart from it. Given, however, normal conditions, there can be little or no advantage of any one fuel over its competitors in the matter of control since the introduction of automatic temperature control devices.

CONSISTENCY IN SUPPLY.

Any variation in the quality of a fuel has its effect on the performance of that fuel during combustion. Coal and coke offend particularly in this respect, the analysis varying to a wide degree, particularly the moisture content.

Oil requires less thorough arrangements than does gas to maintain uniform conditions of pressure and temperature, and hence viscosity at the burner, but this without any control over the analysis of the oil as delivered.

Electricity, while certainly not constant in quality, also has a habit of failing completely—a state of affairs which leads from first exasperation to mere tolerance, and finally the installation of a private generating set in any large works.

Gaseous fuel, despite the ardent publicity of its devotees, cannot be relied upon to provide a constant source of heat. Its failure is due primarily to pressure variations caused almost invariably by insufficient carrying capacity of mains under maximum load conditions. Distance-pressure indicators and automatic governor-operating systems do not alleviate this, but intensify it. For instance, at Stretford the pressure at the outlet of the governor varies from 3·2 in. to 7·5 in. to maintain 3 in. at the boundary. Constant pressure can only be assured by distributing at high pressures and the introduction of individual governors on each gas consuming appliance, presupposing, of course, that the service is of adequate size.

The constant quality problem also required close consideration. It is essential that the manufacture of gas should be carried out and controlled to give as constant a composition as is possible, any variation in composition having a corresponding effect upon calorific value, density, flame temperature, and air required for combustion.

CONVENIENCE OF SUPPLY.

Coal, coke, and oil may be considered extremely inconvenient. Supplies are intermittent, necessitating a storage system which will vary in complexity according to fuel consumption, and location of plant in relation to source of supply. This means a loss of perhaps valuable space, besides adding to an already complex works organization. The pecuniary disadvantages will be referred to under the heading of cost.

Gas and electricity are far more convenient, a plug or a

tap is all that is necessary to ensure a continuous source of supply; no storage is necessary, hence its consequent disadvantages are absent. Electricity has a slight advantage over gas, in that it is more convenient to carry a cable across a works yard and through a shop than to run a gas main.

Efficiency.

The efficiency of a furnace depends upon plant design and operation as well as upon fuel utilized. Solid fuel fired furnaces are subject to the inevitable losses. Excess air is invariably resorted to as a means of ensuring complete combustion; also, there is the loss of heat—sensible and potential—in ashes and waste gases.

Gas and oil fired furnaces also suffer from the loss in the products of combustion, although latest practice tends towards the utilization of regeneration or recuperation. This practice, whether applied to the air used for combustion or to fuel itself, has for its object the raising of the flame temperature, with a consequent increase in combustion efficiency and over-all furnace efficiency. While most intermittent processes do not justify the inclusion of such plant, yet in some processes it is only by such means that sufficiently high working temperatures can be obtained—a typical example being the steel smelting furnace. Regeneration and recuperation practices are particularly applicable to continuous processes.

Insulation as effecting efficiency is a most important factor. Loss of heat from the furnace atmosphere takes place in three stages:

(1) By radiation and convection from chamber to lining.

(2) By conduction to outer surface of furnace.

(3) By radiation and convection to atmosphere.

The furnace lining should then be chosen not only for its refractoriness, but also for its insulation value; thus there may be as many as three linings to a high-temperature furnace.

The loss of heat by radiation from the outer surface of a furnace is far greater than the loss by convection. The use of aluminium paint has been advocated as a means of reducing this loss, due to its low radiation value. Some few years ago a report was published of a series of tests carried out to investigate this fact. An electric combustion furnace was taken, and originally was painted black with white composition board ends. Over a number of tests the power required to reach an operating temperature of 954° C. was 630 watts. After applying a coat of aluminium paint to the furnace exterior, the same power input resulted in a temperature of 976° C. This saving would be justified on any high-temperature furnace.

Another point to be remembered of great importance to the metallurgist as effecting the satisfactory working of a furnace is the atmosphere obtaining within the combustion chamber and its effect upon the commodity during the heating operation. Gaseous fuel has a distinct advantage over its competitors in this respect; by simple adjustment of the air control, the atmosphere may be maintained in a neutral, oxidizing, or reducing condition, and to any degree desirable. It must not be forgotten, however, that the highest efficiency of combustion is obtained when the amount of air used for combustion nearest approached the theoretical figure, and control of atmosphere is better obtained by means of a supply of "purging gas."

Oil firing requires careful adjustment and attention to ensure any such conditions, and the atmosphere of an electric furnace must of necessity be highly oxidizing unless some mechanical methods are resorted to.

Cost.

The relative cost of each fuel will, of course, depend largely upon local conditions of supply, but the following assumed prices are reasonably near the mark for industrial purposes:

Town gas	5d. per therm	= 2s. 1d. per 1000 c.ft.
Fuel oil	1·9d. ,,	,, = 68s. per ton
Electricity	22d. ,,	,, = ¾d. per unit

To make a comparison, it is necessary to take into consideration the efficiency of utilization and the labour involved in handling the fuel. As this labour is non-existent in the case of gas and electricity, the prices of these two fuels remain as previously mentioned, but the price of oil may be increased to 2·25d. per therm to cover handling.

If a heating operation at, say, 1000° C. is considered, and a medium sized furnace having an output of 4 cwt. of steel per hour, the heat input required for the steel would be 1·25 therms per hour approximately. Coming now to the efficiency of the furnaces, the following relative figures are assumed:

Town gas	25 p.ct. efficiency
Fuel oil	23 ,, ,,
Electricity	80 ,, ,,

Hence the actual requirements and costs in each case would therefore be:

Town gas	5 therms	costing 2s. 1d.
Fuel oil	5·45 ,,	,, 1s. 10½d.
Electricity	1·57 ,,	,, 2s 10½d.

From the above comparison it will be observed that, if town gas is to be widely adopted for industrial purposes, the gas undertakings must give careful consideration to price.

It might be added here that the effect of regeneration, recuperation, and preheating must inevitably increase the low efficiency of 25 p.ct. and reduce the final cost figure.

Service.

Improvements within recent years in the technique of furnace design have been extensive, and have resulted in greatly increased efficiencies, but the majority of this progress has been due to research work instituted by the actual makers of furnaces, who are primarily engaged in the production and disposal of furnaces whether gas, oil, electric, or solid fuel fired. The Industrial Research Section of the Birmingham Corporation Gas Department has done considerable work towards the increase in the industrial uses of gas, and it is to such organizations as this that we must look for further advancement in the technique of the gas-fired furnace. The establishment of a series of such centres for the purpose of furthering the knowledge of industrial applications of gas is part of a scheme of work undertaken by the Gas Industry, but more particularly do I wish to refer to individual service to consumers.

Within the next few years this factor of service will prove to be of the utmost importance, and by service I mean a systematic attention to all plants installed. If gas is to take its true place in the industrial and manufacturing world, and prove its real qualities, it must be supported by an efficient service—an organization which will periodically inspect and maintain in good condition its past installations with a view to further improvements and the complete satisfaction of the consumer.

This organization must be composed of skilled furnace operatives, who will also require to have a definite knowledge of metallurgy, chemistry, and general engineering, besides an understanding of the competitive fuels—in short, a fuel technologist is called for. The Gas Industry must satisfy the consumers on whom it is dependent, and not leave it too much in the hands of the furnace makers. Periodic inspections and discussions upon plant will cultivate amicable relationships, which are essential if mutual confidence is to exist between supplier and consumer.

It is proposed now to deal with some of the industrial problems that we at Stretford have encountered, our efforts to solve them, and the results obtained.

(To be concluded.)

Parliamentary Intelligence

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Gas Light and Coke Company Bill and the South Metropolitan Gas Bill have been read a second time and are awaiting the appointment of Committees.

House of Commons.

Private Bills.

The Mid-Southern Utility Bill, the South Suburban Gas Bill, and the Scarborough Gas Bill have been referred to Group "B" Committee, consisting of Sir John Ganzoni (Chairman), Mr. George Harvey, Mr. Gordon Macdonald, and Mr. Perkins. The Committee is meeting on March 2, but will take the South Wales Electric Power Bill before proceeding to the Gas Bills.

The Oakham Gas and Electricity Bill has been referred to the Committee on Unopposed Bills, for which no meeting has yet been fixed.

The second reading of the Kettering Gas Bill has been further postponed until to-day, when it will probably be again deferred.

The second reading of the Commercial Gas Bill has been deferred to Feb. 26.

Special Orders.

Plans have been deposited in connection with the Oxford and District Gas Order.

Bournemouth Gas and Water Company

ORDINARY GENERAL MEETING

The 111th Ordinary General Meeting of this Company was held at the Offices, 48, Copthall Avenue, London, E.C., on Friday, Feb. 19—Mr. WILLIAM CASH, F.C.A., J.P., Chairman of the Company, presiding.

The SECRETARY (Mr. William Cash, Jr.) read the notice convening the meeting, the minutes of the last Annual Meeting were read, confirmed, and signed, and the list of members was sealed.

The CHAIRMAN then proposed "That the Report and Accounts to Dec. 31, 1931, as presented at this meeting be received and adopted."

SIR ARTHUR DUCKHAM AND MR. PLUMB.

Before dealing with the accounts he said there were two matters to which he wished to allude. In the report there was a reference to the deep regret of the Board at the death of Mr. Plumb, who was Secretary of the Company. He had, he said, been personally associated with Mr. Plumb for 47 years, and he was as loyal a friend and partner for more than 40 years as could be desired. Mr. Plumb possessed high abilities as an accountant, and his great skill and judgment had been unreservedly placed at the disposal of the Company during the 22 years he had acted as Secretary. Arising out of the death of Mr. Plumb, he felt personally a sincere gratification at the appointment of Mr. William Cash, Jr., as Secretary to the Company with the unanimous approval of his colleagues on the Board. Mr. Cash was the third William Cash to act as Secretary of the Company, and it was a great pleasure to him personally that Mr. William Cash, Jr., had succeeded to that position.

The other matter to which he wished to refer was of a similar character to the first that he had mentioned, and that was the death of Sir Arthur Duckham, G.B.E., K.C.B., who died on the previous Sunday very unexpectedly at the age of only 52. Sir Arthur was apprenticed under Sir George Livesey, of the South Metropolitan Gas Company, and the first position that he really held in the Industry as an officer was that of Assistant Engineer to the Bournemouth Gas and Water Company in 1902. He was with the Company for four years, and during that period (with Colonel Woodall) he designed and brought into use the Woodall-Duckham vertical retort now so well known throughout the Industry. This was not the place to attempt any appreciation of the work which Sir Arthur Duckham did of a national character. Both during the war and afterwards he held many important positions. In 1919 he served on the Sankey Coal Commission, and in 1928 the Government sent him out as Chairman of the British Economic Commission to Australia. Sir Arthur had also done very valuable work on fuel research, especially in connection with the National Fuel and Power Committee. This work had been recognized by the honours that had been bestowed upon Sir Arthur by the nation and by the State; but he had felt it appropriate at the first meeting of a Company of any importance in the Industry, and, as it happened, a Company with which Sir Arthur was particularly associated, to refer to the work he had done for the Gas Industry, because his very great ability and influence were always available to the Industry. It was melancholy to think that only next month Sir Arthur was to have been President of the Joint Gas Conference at the British Industries Fair in Birmingham, and, said Mr. Cash, in his own humble way he wished to place on record, if he might be allowed to speak before the Gas Industry, the recognition of the Industry of the very valuable help and influence which Sir Arthur had always brought to the assistance of the Industry in innumerable ways. Sir Arthur Duckham was a personal friend of his for many years, but Colonel Woodall knew Sir Arthur even more intimately than he did.

A SATISFACTORY REPORT.

Turning to the report and accounts, the Chairman said he had great pleasure in presenting them because he believed the shareholders would consider them very satisfactory. In the capital account it would be seen that the main transaction was that the Board had redeemed £100,000 7 p.ct. debenture stock, issued during a time of financial stringency shortly after the war, and had replaced it with a 5 p.ct. irredeemable stock on favourable terms. This stock was exchanged by the majority of the holders, but at a price of 102½ or nearly 102 net to the Company. This was an extremely favourable transaction from the Company's point of view, and would effect a saving in future years of the charge for interest of £2000 per annum. On the debit side of the capital account the expenditure on land included some additional land bought at Poole and further land bought at Alderney, to protect the reservoir there and to provide for future extensions when these were necessary. There was also capital expenditure on the completion of the sports ground, to which he had referred last year. These items together involved an expenditure of £10,791. In respect of buildings there was the completion of the showroom, the completion of a new set of vertical retorts at Poole, and some boosters at Bourne Valley. In connection with the water undertaking, there had been some heavy expenditure on the completion of the work of covering in the large reservoir and erecting a pump house and cottages at Alderney, and there had also been expenditure on a new pump house and sedimentation tank, as well as pumps, at Longham. He wished to emphasize that this expenditure on water was all made with the one object, if possible, of rendering still more perfect the supply of water to Bournemouth. The capital expenditure represented new measures undertaking to deal with the water on the most modern lines, and he was sure the shareholders would approve of these efforts to do everything possible to make the water supply of Bournemouth of a most perfect character. As regards the sports ground, there would now be adequate facilities for football, cricket, and tennis. These had cost the Company a considerable sum of money, but the Board felt that, though it was expensive, the fitting out of the sports ground was a wise thing to do. It was very much appreciated by the men and staff, and cemented the good relations which existed between them and the management. The remainder of the expenditure was of the ordinary character on new mains, meters, &c.

Turning to the revenue account, the Chairman pointed out that, though comparative figures with previous years were shown as usual, it must be borne in mind that in some measure the figures were not completely comparative, for the reason that every now and again it was necessary to review the apportionment of such of the expenditure as is directly attributable to either gas or water. For this reason, in attributing the expenditure in as fair proportions as possible between the two undertakings, it would be seen that the expenditure on gas for 1931 was rather more than it was in 1930 in respect of certain items, and water, therefore, obtained some relief. He was happy to say, however, that the expenditure on the two undertakings had been carefully watched, and the Board was satisfied that each undertaking was bearing its fair share of the ultimate capital charge.

On the receipts side of the accounts, it was seen that the sales of gas were up by £15,000, the sales of residuals were up by £7000, and sundry items by £1241, making a total increase of £23,464 in receipts. The expenses had increased by £13,000, leaving a net improvement of £10,400. In the case of the water undertaking, the receipts were up by £3175, and the expenses were down by £5091, showing a net improvement on the water undertaking of £8266. Included in the expenditure of the gas undertaking was a very heavy charge for the costs of the Rating Appeal, which he referred to a year ago. This appeal was in effect an appeal to the Quarter Sessions, and it was settled on terms by which the Company agreed to contribute to the costs of the two opponents. The assessment of the Company in the Poole area had been agreed to March, 1934, with some slight yearly allowance for increased business. The Board thought it was wise to settle on these terms though they were not enormously pleased with the settlement; it was undoubtdly deplorable that such a fight was possible involving such heavy expense on such a matter as rating. There had recently been issued a report by the Central Valuation Committee. This was a report to the Minister suggesting improved methods of procedure as to valuation, and he was pleased to think there was some ground for believing that these suggestions would be adopted at the next quinquennial valuation. This ought to assist in the settlement of these complicated matters, which were particularly complicated in cases where companies had areas of supply extending into more than one rating area.

INCREASED SALES OF GAS.

The sales of gas had increased by 6·15 p.ct., an extremely satisfactory result as compared with 1930. In fact, he believed it was almost as good as any result he had seen in the Gas Industry. That increase was equivalent to an increased consumption of 150,000,000 c.ft., and it was really remarkable. The sales of apparatus were not quite so large as in 1930, and consequently the profit on that portion of the business was not so large; but it might be interesting to mention that during the year 11,861 new appliances were fitted, all of which were using gas. The appliances which the Company recommended to its customers were believed to be the best and most effective and most economical. All of this tended in a measure to reduce consumption by the individual consumer, but, on the other hand, the use of gas was continually growing for all sorts of purposes—heating, industrial, and domestic use. In this connection he had been particularly struck by an article which appeared in the Company's Bulletin which reported a speech by one of the employees—a Mr. Simmonds, of Bournemouth—as to the sales value of window display. This showed that as the result of a suitable window display of an apparatus known as "Toast with Ease," some hundreds of these articles were sold not only in Bournemouth, but in other parts of the country where apparently visitors to Bournemouth had mentioned the apparatus to their friends. In fact, some were actually sold in Ireland. This same article referred to another window display of a gas-heated poker for lighting coal and coke fires, and as a result of this display some 200 of these pokers were sold. The article went on to point out that if the minimum consumption was only 3 c.ft. per day and the poker was used regularly during the six winter months of the year, there would be a consumption of 109,000 c.ft. per annum. This, continued the Chairman, was typical of what could be done by intelligent work

on the part of the employees. It was, of course, only a small matter, but it involved the sale of about 100,000 c.ft. of gas.

Progressive Features.

The water undertaking had supplied a substantially increased quantity of water, and during the year there had been laid 13½ miles of new gas mains and 4½ miles of new water mains, or a total of 18 miles. The number of gas consumers had increased by 2383, making a total of 52,359, while water consumers had increased by 1225, making a total of 29,842. One satisfactory feature was that the capital expenditure per million c.ft., which was bound to fluctuate as between one year and another, was down by nearly £8 as compared with 1928. Another satisfactory feature was that during the year the Company had again reduced the price of gas by a substantial sum—namely, 0·4d. per therm, making the price 8·2d. per therm, which he believed was lower than the price charged by any of the London companies. This reduction was made in September, 1931, and it would therefore become fully effective in 1932. In a full year's working it would cost the Company £20,000. The price of water was again reduced in July. The position in this respect was that the Company had been authorized to add 33⅓ p.ct. to its statutory charges in 1921. By July, 1930, this had been reduced to 15 p.ct. addition, and in July, 1931, it was reduced to 10 p.ct.

From the net revenue account £5000, as against £10,000 last year, had been added to the Pension Fund, and the reason for that decrease was a very satisfactory one. The Board had been informed that the fund was now actuarially solvent. During the year, by means of contributions and interest, the fund had been increased by £28,000, and in future there would be a slight relief to the Company in regard to its contributions to this fund. There was a slight balance on the retort renewal fund of £7161, and this would be required to complete work actually in hand. On the other hand, there was the renewal fund which Parliament authorized to which the Company was making the full statutory contribution. There was also the special purposes fund to which substantial additions had also been made during the year. The value of the Company's investments stood in the balance-sheet at £86,929 on Dec. 31, 1931, but actually they were worth more than the balance-sheet figure by £3369, and probably they were worth considerably more to-day, all of which was very satisfactory.

Continuing, the Chairman mentioned that the British Water-Works Association proposed to hold its Annual Conference in Bournemouth in June this year, and had done him the honour of making him President-elect. He believed the Company would be able to show those taking part in the Conference something of interest in Bournemouth, and felt very gratified that the British Water-Works Association should have decided to hold its Annual Conference there in the coming summer.

A Bright Future.

Looking to the future, what was the position? New building seemed to go on in Bournemouth, and the population seemed to increase, bringing with it a substantial increase in the number of consumers. There was not only an increase of the native population in Bournemouth, but undoubtedly people came to Bournemouth and its neighbourhood from all over England. It was an area with many attractions and amenities, and there were a large number of beautiful houses, hotels, and boarding houses. There was also a large number of small houses occupied by people of quite moderate means who came to enjoy their declining years in Bournemouth. All these houses, whatever their class, and particularly perhaps the small houses, were valuable from the point of view of the Company. It was interesting to remember that the Company's gas area, which began to the west at Poole, covered Poole, Bournemouth, Christchurch, Highcliffe, Barton-on-Sea, and as far as Milton and Milford-on-Sea. Inland the area included Winton and Kinson, a rapidly growing area, and for water it included the town of Wimborne. This led the Board to think that the Company's business would continue to grow and would necessitate in the near future further issues of capital. The results shown in the report for last year led him to suggest that when this new capital was issued it would be an investment which ought to commend itself to the shareholders who knew all about the Company, and to their friends who might be seeking investments of this character.

Sir Charles L. Morgan, C.B.E., M.Inst.C.E. (Deputy-Chairman), seconded the resolution for the adoption of the report and accounts.

Mr. Harold J. Palmer asked whether additions were made to the reserve fund regularly every year or as and when convenient.

The Chairman replied that last year nothing had been added to the reserve fund, and it was partly with that object that the Board was thinking of issuing further capital, because they were paying 5 p.ct. in respect of the uninvested portion of the reserve fund and could possibly raise capital at very little over 5 p.ct., so that it would undoubtedly improve the position if that fund was more closely invested.

The motion for the adoption of the report and accounts was then carried unanimously.

The Chairman then moved the payment of a dividend for the second half-year at the rates of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 9 p.ct. on the original (sliding-scale) shares.

Lt.-Col. Harold W. Woodall, C.I.E., M.Inst.C.E., in seconding, said he wished to take the opportunity of associating himself with the Chairman's remarks concerning the late Sir Arthur Duckham. He felt it very difficult to speak on the subject because Sir Arthur was such an intimate friend of his. His work not only for the Gas Industry but for the country and internationally was so well known that it did not need emphasizing on this occasion. Everybody who knew him and had associated with him would remember Sir Arthur Duckham as the best loved man they ever knew. When he rose to such very great heights it made no difference whatever in his relationship with other people. Anybody, however humble, could always go to Sir Arthur Duckham, who would always meet them and do the very best he could for them.

The resolution was unanimously passed.

Sir Charles L. Morgan, proposing the re-election of Mr. William Cash as a Director of the Company, said the fact that the Chairman himself had just mentioned his association with the late Mr. Plumb for a period of nearly half-a-century was in itself sufficient recommendation for his re-election to the Board. The shareholders were very fortunate indeed in having a man possessing such knowledge of the Gas Industry and occupying such an eminent position in it, as well as in other industries, and personally he did not believe they could find a man in the City of London more fitted to be a Director of the Company.

Sir John J. Withers, C.B.E., M.P., seconded.

The resolution was carried unanimously.

The Chairman proposed the re-election to the Board of Sir George Jessel, Bart.

Lt.-Col. Woodall seconded.

The resolution was carried unanimously.

On the motion of Mr. Harold Palmer, seconded by Mr. F. Robins, the re-election of Mr. W. B. Paton, F.C.A., was unanimously agreed to.

Shares Conversion.

The Chairman then dealt with the resolutions dealing with the conversion of the Company's shares into stock which the Board had prepared, and explained that this conversion was proposed for two or three reasons. In the first, place, it was a very tiresome and laborious business numbering all the shares, and there was no risk in conversion from that point of view. Then as regards the Stock Exchange quotation, it was much more satisfactory that there should be a price per £100 instead of a price per share. He much preferred to see a figure of 102 instead of, for instance, 12⅝. Again, the co-partners invested in shares in the Company; but inasmuch as the price of a share was about £15 this was rather a large sum for a working man, and it was a long time before he was able to obtain one share. On the other hand, if it were possible for a co-partner to buy (say) stocks to the value of £5 and could add to it from time to time in multiples of £1, which was provided for in the resolutions, he could add to his holding each year. This was following the policy of a great many other companies, and it would make no difference to the existing shareholders, who would hold exactly the same quantity of stock as they did shares. The proposals would take effect as on June 30 next; the reason being that it would take a little while to write out several thousand stock certificates, and the Stock Exchange, before they would quote the stock, required that the certificates should be ready for delivery. However, shareholders could buy or sell shares between now and June 30 in the same way as previously. One other small advantage was that on the division of an estate it was easier to divide stock than shares. The resolutions were as follows:

1. That the existing 17,775 five percentum (sliding-scale) shares of £10 each in the capital of the Company be converted on the 30th June, 1932, into £177,750 stock to be called standard 5 p.ct. (sliding-scale) stock to be entitled to a standard rate of dividend of five pounds percentum per annum subject to the sliding-scale.
2. That the existing 55,055 "B" ordinary seven percentum shares of £10 each in the capital of the Company be converted on the 30th June, 1932, into £550,050 stock to be called maximum dividend (7 p.ct.) stock to be entitled to a maximum rate of dividend of seven pounds percentum per annum.
3. That the existing 43,916 six percentum preference shares of £10 each in the capital of the Company be converted on the 30th June, 1932, into £439,160 stock to be called "preference stock" to be entitled to a maximum rate of dividend of six pounds percentum per annum.
4. That the minimum amount of stock to be held by any holder shall be the nominal sum of £5. Subject thereto stock may be transferred in multiples of £1, the minimum amount so transferable being £1 of stock.
5. That the authority given to the Directors on the 22nd February, 1929, of raising additional capital in accordance with the provisions of the Bournemouth Gas and Water Act, 1928, so far as the same has not been exercised, be extended by authorizing the Directors to create and issue stock of any of the classes mentioned in the above written resolution instead of shares.

Sir Charles Morgan seconded.

The resolutions were carried unanimously.

Votes of Thanks.

The Chairman, proposing a vote of thanks to the officers, staff, and workpeople, both in Bournemouth and London, expressed regret that Mr. Moon, the Engineer and General Manager, had been unable to come to the meeting owing to

illness. As in previous years, the staff had carried out their duties in a most satisfactory manner. The results on the technical side, as distinguished from the financial side, were excellent, while the report and accounts were sufficient evidence on the financial side. It was in these circumstances that he asked the meeting to express its thanks to the staff for the manner in which they had carried out their duties during the past year. The co-partnership scheme was working satisfactorily and tended towards the amicable, loyal, and enthusiastic service which was given by the Company's employees from top to bottom.

Miss M. J. SMITH seconded.

The resolution was carried with acclamation.

Mr. WILLIAM CASH, Jr. (Secretary), acknowledging the vote of thanks, promised that it should be conveyed to Mr. Moon and the staff at Bournemouth, because he felt that it was addressed perhaps more to them than to the London staff. For himself he could only say that, coming to the Company as he did after the death of Mr. Plumb, it was an enormous help to him personally to have Mr. Moon and the officials and staff at Bournemouth giving him, an untried Secretary, a great welcome. While the work done at Bournemouth was reflected in the London office through the figures, the position of the Company was due to the unremitting attention, the skill, industry, and patience, together with the team spirit, which was such a feature of the Company at Bournemouth. Therefore, it would be the greatest possible pleasure to him to convey to those in Bournemouth this vote of thanks, which was not a mere formality but something which had a real meaning behind it.

On the motion of Mr. ROBERT H. GLEN, seconded by Mr. W. B. PATON, a cordial vote of thanks was passed to the Chairman and Directors.

Hornsey Gas Company

ANNUAL GENERAL MEETING.—LOW PRICE OF GAS

The Annual Ordinary General Meeting of the Hornsey Gas Company was held at No. 5, Great Winchester Street, London, E.C., on Friday, Feb. 19, 1932. Mr. A. M. PADDON, M.Inst.C.E. (Chairman of the Company), presided.

The SECRETARY read the notice convening the meeting.

The CHAIRMAN stated that under a new Governmental Order the formality of fixing the Seal of the Company to the list of proprietors was dispensed with.

The Directors' Report and Statement of Accounts for the year ended Dec. 31, 1931, were taken as read.

CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving that the Report and Accounts be received, adopted, and entered on the Minutes, called attention to the information in the report that the sale of gas had increased on the previous year by 2 p.ct. He considered that a matter of no small gratification, having regard to the special circumstances which prevailed during the period covered by the accounts. In the early part of the year, in common with all gas undertakings, they experienced a considerable extension of business, but that steadily deteriorated during the year as national affairs became more and more depressed; and the fact that they were able to emerge from the completed year with an increase was in itself gratifying. During the coming year they must be prepared for a very considerable truncation in the output of gas. That was common to every undertaking, and they had to adapt themselves to that general condition. Their Directors had not been unmindful of that fact, and already all the necessary steps had been taken to accommodate their financial policy to the circumstances. They all hoped that they might be temporary in character and that they might get some development of their business towards the end of the year in connection with a general improvement in national conditions, but that was only anticipation, intelligent or otherwise, and their budget was made and their policy was formulated to accommodate themselves to a period of depression of which at the present time they could not see the exit. He also called attention to the fact that the Hornsey Gas Order, 1931, was duly granted by the Board of Trade on Dec. 4, 1931.

Turning to the capital account, the Chairman pointed out that they had unissued ordinary stock amounting to £71,000, and they had power to borrow, if they desired to do so, £180,000 more. As far as he could see those figures would go very very far beyond the requirements of the undertaking. As they knew, their district was circumscribed and limited. They had no opportunity for development in the way that outlying districts enjoyed it. They really had to fight for their business in a circumscribed area with the most intense competition, and they therefore could not expect any very great development of the Company's output. That would probably exempt them from any obligations with regard to the issue of capital in the near, or even the remote, future. He supposed few gas shareholders realized how dependent they were nowadays upon the development of new districts if they were to enjoy an expanding business. Some of the very large undertakings in London had only an increase of something like 14 or 15 p.ct. over the pre-war output. That was the case where new areas were not available. As one of their most valued colleagues, Mr. Arthur Phillips, used to say, "Unless you improve the relation between your capital and your business, development of business is of no particular advantage to the shareholders. It does not give them any more dividend; it only increases the class receiving some degree of financial benefit," and he used to say "*Cui bono?*"—to what good? But they all knew that no undertaking could stand still. It either had to go forward or it would fall back. While, therefore, they might anticipate the preservation of their position, and some slight development of it in connection with the special uses, they would not expect in their conditions that development of business which the ordinary suburban undertaking obtained.

LOW PRICE OF GAS.

In support of what he had said they would notice from the accounts that the Company had only expended just over £2000 by way of capital during the past year, but had increased by 2 p.ct. the sale, and that was equal to 16 million c.ft. If they capitalized that increase of 16 million at £500 a million, it would justify an expenditure of at least four times the amount in the capital account. So they had slightly improved the ratio between capital and business during the year, and their capital per million stood at the figure of £434, which those conversant with gas accounts would recognize at once as extremely low. It was that figure which largely determined the prosperity of a company, and the price of gas, because it absolutely defined the amount they had to make in the way of profit to satisfy the proprietors. The lower it was the less the demand upon the public. As they knew, they were selling at an extremely low price—the lowest for the whole Metropolis in any complete area—at only 8d. per therm. That was extremely satisfactory, and one of the reasons for it was their low capital. But the capital might be low and yet the situation not a satisfactory one, unless the works, and the property of the undertaking, and the plant producing the results, were in good condition and fully represented their capital value. On that point he could assure them that their works and plant were kept in the maximum condition of efficiency. He had heard several engineers say that they knew no works in the London district which could surpass the Hornsey Works in general efficiency, tidiness, and the faculty for keeping abreast of modern developments. He was sure it would be gratifying to them to know that, because otherwise a small capital per million was no assurance; they also needed to be satisfied that the property of the Company was in proper condition.

LOW FIGURE FOR UNACCOUNTED-FOR GAS.

Coming to the revenue account, gas had brought in £12,765 more by reason of the increase in the sales and in the price of gas, which latter had not exceeded the figure he had mentioned. On meters they showed a small decrease; on rentals of stoves and fittings a small increase; and the total increase under all those general items amounted to £13,273. This improvement had been supplemented by the receipt of over £2000 more for coke, but they had not done so well on the other residuals. The total increase on residuals was £839, and the total receipts were increased by £14,645 as compared with a year ago. They would be pleased to hear that the unaccounted-for gas amounted to only 2·3 p.ct. On the other side, coal, &c., had cost about £1200 less, and maintenance of works and plant about the same amount more. Mains had increased by over £2000, and stoves and fittings had decreased by nearly £1000. That was due to the fact that they had no accumulation of stoves and fittings to write off, such as was customary in the general run of such undertakings. All charges for stoves and fittings were debited to the revenue account, and the Company was thus relieved of a very considerable annual burden. Rates had decreased by £740. The only other figure he thought it necessary to draw particular attention to was their handsome contribution of £3576 to a renewal fund. They had not hitherto had the right to create such a fund, but had acquired the right under a recent Order; therefore the renewal fund did not appear in the accounts on that occasion as a separate fund. If they were there a year hence they would find a new fund under that heading which would be of the greatest possible assistance to them. As he had said, receipts had increased by £14,645, while expenditure had increased by £3894, and profit by £10,751.

Turning to the profit and loss account it would be seen that they had appropriated from the carry-forward the sum of £7500 for obligations in regard to superannuation. That would connect itself with the Contributory Pensions Fund which was presently to be submitted for their approval. But it served another purpose. They were limited by their Act as to the amount they could carry forward from year to year as undivided profits, and they had sometimes exceeded that limit to an undesirable extent—indeed to an extent that might provoke legal or Governmental comment. They were under direct obligation to reduce that carry-forward within the proper limits. Even after they had made that provision for superannuation they would still carry forward an amount of nearly £2000 in excess of what they were authorized to do. But it did show that they were doing their very best to conform to the obligations put upon them by Parliament and to carry out a duty which it was absolutely incumbent

upon them to discharge. The balance carried forward, therefore, was £1278 less than a year ago, but still exceeded by nearly £2000 the amount they were authorized to carry forward.

The reserve fund was not as large as he or any of his colleagues would have liked to see, but it was a comparatively new one. The early history of the Company was not devoted to the creation of a reserve fund. However, it was growing, and they carried to it all that they could, but their dividend and their selling price did not allow of their supplementing it at the present time.

The special purposes fund account to some extent took the place of the old insurance fund, and was designed to meet abnormal demands which, though they could not be foreseen, inevitably occurred. That was invested to the extent of £11,655, and he and his colleagues were agreed that reserves which were invested outside the Company were much more actual and valuable, because they were immediately available. There was the alternative policy (followed, he thought, to an extreme degree by some undertakings) of investing reserves in the Company, but, if the day came when they were required, that necessitated one of two courses—borrowing from the bank, or the issue of new capital—and it seemed to him that a moment of exigency and difficulty was the very last moment to do either.

With regard to pensions, the benefit fund account had hitherto served their purpose. The provisions were adequate at the time of their inception, some twenty years ago, but they were no longer so. They could not support the whole burden of pensions now and they had to inaugurate a contributory pensions fund to apply as from a certain date. They had, of course, to fulfil their obligations to their old pensioners, and to those to whom the promise had been made it must be kept; but in all the cases with which the new scheme was concerned the men had shown perfect willingness to join in a contributory scheme. It would be a great relief to the Company. They would have to establish a sinking fund to satisfy legal and Governmental requirements.

The balance-sheet showed that the investments totalled £25,000. Deposits with the bank were shown as an investment. The £23,000 actually invested had a current value of over £24,000. He thought they would agree that that was quite satisfactory. They would be pleased to see that they had standing to the credit of their Co-Partners £17,671, although that fund had only been in existence eight years. That constituted an *a fortiori* argument in favour of the scheme, and plainly showed how important it would become. The Directors were under no misconception as to its value, and he did not think the men had any misunderstanding on the subject either. When one looked round and saw the almost general unemployment the country was passing through and its repercussions on national finance and industry, it must be a great satisfaction to the shareholders, as to the Directors, to know that the relations with labour were so satisfactory, as the accounts indicated, and the men must be aware that they enjoyed a security which was very very far indeed from being general at the present time. It had its effects on the accounts. The Engineer would tell them that there was a vast dissimilarity between the service of a co-partner and one who was not a co-partner, and the Chairman felt the movement had deserved all the efforts and the money they had bestowed upon it. [Applause.]

Mr. G. W. CAREY (Deputy-Chairman) seconded.

The Resolution was then put to the Meeting and carried.

The CHAIRMAN then proposed:

> "That there now be declared dividends for the half-year ended Dec. 31, 1931 (being the final dividends for the year) as follows: On the Preference Stock, £5 p.ct. per annum; on the 5 p.ct. stock, 7½ p.ct. per annum; and on the 3½ p.ct. stock, 6 p.ct. per annum; all less income-tax (making with the interim dividends already paid on the 5 p.ct. stock and 3½ p.ct. stock respectively 7½ p.ct. and 6 p.ct. for the year), and that such final dividends be paid on Tuesday, March 1."

Mr. F. H. JONES seconded the motion, and it was carried unanimously.

The CHAIRMAN then proposed:

> "That the Company do establish and maintain a pensions fund as authorized by, and to be applicable for the purposes mentioned in, sub-section (2) of section 4 of the Hornsey Gas Order, 1931.
>
> "That the Company do put in force a Scheme under sub-section (3) of the said section 4 as to-day considered and approved by the Company. That the Directors do take all necessary steps to give effect to the foregoing resolutions."

In 1912, or thereabouts, said the Chairman, Parliament allowed them to acquire a certain rate per thousand cubic feet—½d. was the amount—and to devote that to the purpose of granting pensions to their workpeople. It was non-contributory in those days. Wages were then less than half, for unskilled labour, what they were to-day and with a disproportion in regard to the different grades, and, furthermore, since then the Company had had imposed upon it additional burdens in the way of public services, compulsory insurance, unemployment, and all those different charges, and it had soon become obvious as these supervened that the original provision was completely inadequate to enable the Company to carry out its promises to the employees as outlined at that time. The very fact of pensions having been based on wages, and wages not having gone up, would have completely invalidated any such financial arrangement. They had therefore had to terminate that arrangement by notice that it would not go on beyond a certain date, and after that a contributory scheme for all future employees of the Company would be necessary. But they had to appeal to the co-partners to see whether they would support the Directors by becoming contributors to a fund which would provide them with similar pensions as in the past.

The position of the old pensioners would not be affected in any way, and it would depend upon the attitude of those qualifying for pension at the present time as to how far the new scheme was effective. In all other companies they had accepted it, as co-partners might be expected to do, in order to help the Company in their difficulty; and when the scheme had been adopted by them it would be his duty to present it to the co-partners for their acceptance. It was not a new scheme; it was of a generic order. It had been inaugurated in those Companies which were associated with them in the Benefit Fund of 1912, and here, as in those cases, it had been subject to actuarial review. Being on an actuarial basis there could be no doubt as to the soundness of the scheme. The existing pensioners were not affected. Those eligible for pensions would be asked if they would join, and would pay 3 p.ct. of salary or wages; new employees after Jan. 1, 1930, who were insured persons would pay 3 to 5 p.ct. of four-fifths of salary or wages, and non-insured persons 3 to 5 p.ct. of full salary or wages. The Company would contribute an equal amount; 1d. for 1d., or 1s. for 1s. The minimum age for joining would be 21, pensions would be payable at 65, and the minimum period of service to qualify would be 20 years. All those were features of the present scheme. As to the calculation of pensions, the first two classes were not affected. With regard to the new classes, insured persons would receive one-sixtieth (maximum forty-sixtieths) of four-fifths of average salary or wages for each year of contributing service, and non-insured persons one-sixtieth (maximum forty-sixtieths) of full average salary or wages for each year of contributing service. In case of illness or incapacity or mental infirmity, or anything of that sort, the rules provided for that, with Directors' discretional authority, and the Company would be responsible for the management of the Fund, and would guarantee it, as they had had to do the former one, but in the present case supported by actuarial valuation and estimates. They would observe from that outline of the scheme that it would relieve the Company from almost impracticable obligations in the future, and he sincerely hoped that in that case, as in others, it would recommend itself to those who had an expectancy of pension at the present time; and if that were so their position as a Company would be lightened and strengthened in regard to that duty to their employees.

Mr. E. L. BURTON seconded.

The Resolution was put to the Meeting and adopted.

The CHAIRMAN then proposed:

> "That the Company do borrow by the creation and issue of Debenture Stock the amount of £141,800. That the Directors be and are hereby authorized to issue such Debenture Stock, or any part or parts thereof, at such time or times, at such rate or rates of interest, at such price or prices and otherwise on such terms and conditions as they may determine at the time or times of the issue thereof."

That did not mean, he explained, that they were going to issue the stock, it simply meant that they took the power to issue. It was simply giving the Directors the necessary power to make such an issue in conformity with the powers conferred upon them by Parliament.

Mr. F. H. JONES seconded, and the Resolution was adopted.

The CHAIRMAN, proposing the re-appointment of the retiring Directors, Mr. G. W. Carey and Mr. F. H. Jones, said that they had known those gentlemen for very many years, and both possessed the most practical qualifications for the discharge of their duties. They had been long in the Gas Industry, and Mr. Jones' technical knowledge was of the most valuable nature to the Company; Mr. Carey's knowledge of financial matters was an equal asset in administration.

Mr. E. L. BURTON seconded, and the motion was passed.

Mr. CAREY, replying, said he had served the Company for twenty years and much appreciated their kind sentiments.

Mr. JONES also returned thanks.

Mr. K. R. MACKAY, in moving the re-appointment of Mr. H. A. Floate as Auditor of the Company, mentioned that Mr. Floate had served in that capacity for thirty years.

Mr. A. H. GODWIN seconded, and the motion was adopted.

Mr. FLOATE expressed his thanks. It gave him the greatest pleasure to go through the Company's accounts, because they were invariably accurate, and any information required was always forthcoming from Mr. Mortimore.

The CHAIRMAN, proposing a vote of thanks to the Engineer and General Manager, the Secretary, and other Officers and the employees for their services to the Company, said that one of the circumstances which enabled him to look forward with great confidence to the future was the remarkable efficiency of their Officers. In Mr. Buckley they had a most able and devoted servant. He had never known Mr. Buckley's knowledge at fault. The Directors were agreed that they had in him one of the most able executive Officers in the Gas Industry, and they would not exchange him for anybody. He would be a great help to them during the coming year.

In Mr. Mortimore, who had been with them now for several years, they also had a valued Officer. He could always get from Mr. Mortimore at short notice an answer to any question he asked him with regard to the financial problems, and the answer was always right. With regard to the personnel, they could not be better served than they were by their technical establishment, officers and men, and by their co-partners.

Mr. F. H. JONES, seconding, said that the dividends that had been declared would not have been forthcoming, and they would

not have progressed very far, had it not been for the work of Mr. Buckley and the other members of their staff.

Mr. K. R. MACKAY, as a resident in the Hornsey District, associated himself with the resolution and expressed appreciation of the courtesy and attention that he received from all the officers and staff of the Company.

The resolution was carried.

Mr. J. W. BUCKLEY, M.Inst.C.E. (Engineer and General Manager), expressed his thanks, and emphasized that whatever success attended his efforts was made possible by the cordial co-operation and help that he received from his subordinate officers and the employees. He desired to place on record his appreciation of the work of the Co-Partnership Committee members. He had thoroughly enjoyed presiding at their meetings, and he thought the Minutes revealed no instance of any division on any important point. He had every reason to believe that they would continue year after year that satisfactory co-operation for the benefit of the Company.

The SECRETARY (Mr. K. Leslie Mortimore, A.C.A.) also expressed his thanks and that of the staff.

On the motion of Capt. H. F. WILKINSON, seconded by Mr. A. H. GODWIN, a vote of thanks was accorded to the Chairman and his co-Directors for their management of the Company during the past twelve months.

The CHAIRMAN, responding, expressed the Directors' deep appreciation of the compliment. He emphasized the necessity for them to be in more or less sensitive touch with each other during the coming year, and the knowledge that they had the confidence of the shareholders would be a great help to them.

The Meeting then closed.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

More active conditions prevailed in most markets on the Stock Exchange last week, and the position was further improved towards the close by the reduction in the Bank rate from 6 to 5 p.ct. This is evidence enough that the monetary authorities are satisfied with the state of the country's financial position, and adding to this the firm belief that the Budget will balance there is some justification for the prevailing optimism as regards the future. Already there are indications that the investing public has commenced to take more interest in Stock Exchange affairs.

The prices of Gas stocks and shares continued firm, and a large volume of business was recorded, particularly in the ordinary stocks of the three Metropolitan Companies and Imperial Continental. The latter stock rose rapidly and closed the week 20 points up at 350. A number of issues were marked down *ex* div. on Monday of last week, and such was the demand that before the week closed the price of some of these issues had almost wholly recovered the reduction, while in the case of two stocks (Gas Light 3½ p.ct. maximum and South Metropolitan 6 p.ct. preference) values had increased a point beyond the previous week's level. Among other improvements were British 7 p.ct. preference and Wandsworth consolidated—both rose 2 points to 112½ and 114 respectively—and Gas Light and South Metropolitan 5 p.ct. debentures also showed gains of 2 points on the week. Apart from the *ex* div. reductions, the only fall of any note was a drop of 3 points in European ordinary to 105.

Included in last week's dividend announcements were the following:

—	First Half.	Second Half.	Year 1931.	Year 1930.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.
Barnet	3½	3½	7	7
Bournemouth 5 p.ct.	4½	4½	9	9
" "B"	3½	3½	7	7
Chester	2½	3½	5⅞	5⅞
Harrogate	5	5	10	10
Liverpool	3	3	6	6
Mid Southern District Utility "C"	2½	2½	5	5
Uxbridge	3½	3½	7	7

Current Sales of Gas Products.

The London Market for Tar and Tar Products.

LONDON, *Feb.* 22.

The values of tar products have not altered and are as follows:

Pitch is firm at 85s. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon f.o.b., according to specification.

Pure toluole is about 2s. 9d. per gallon at makers' works; pure benzole, 1s. 8d. to 1s. 9d. per gallon; 95/160 solvent naphtha, about 1s. 5d. per gallon; and pyridine bases, 90/140, about 3s. 9d. to 4s. per gallon.

Tar Products in the Provinces.

Feb. 22.

The average prices of gas-works products during the week were: Gas-works tar, 36s. to 41s. Pitch—East Coast, 75s. to 80s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 75s. to 80s. f.o.b.* Toluole, naked, North, 1s. 10½d. to 1s. 11d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 3½d. to 3¾d.; low gravity, 1¼d.; Scotland, 3½d. to 3¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid, 60's, 1s. 7½d. to 1s. 8d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Feb.* 20.

With few exceptions quotations remain firm in this district, although the volume of business is disappointing.

Pitch.—Value is steady at 77s. 6d. to 80s. per ton *ex* makers' works in bulk for home trade, while export remains nominal at 75s. to 77s. 6d. per ton f.o.b. Glasgow.

Refined tar to Ministry of Transport Specification remains at 4d. to 4½d. per gallon f.o.r. naked with distillers unwilling to commit themselves to any great extent.

Creosote oil.—Supplies remain quite short and values of all grades are steady. B.E.S.A. Specification is 3d. to 3¼d. per gallon; low gravity, 3¼d. to 3¾d. per gallon; and neutral oil, 3¼d. to 3¾d. per gallon—all f.o.r. in bulk.

Cresylic.—There is little or no demand. Pale, 97/99 p.ct., is 1s. 1½d. to 1s. 2½d. per gallon; dark, 97/99 p.ct., 1s. 0½d. to 1s. 1½d. per gallon; and pale, 99/100 p.ct., 1s. 3½d. to 1s. 4d. per gallon—all *ex* works.

Crude naphtha.—Available supplies command 4½d. to 5d. per gallon f.o.r., according to quality.

Solvent naphtha.—The market is dull. 90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 1s. to 1s. 1d. per gallon.

Motor benzole.—Quotations are unchanged at 1s. 3d. to 1s. 4d. per gallon f.o.r. in buyers' tanks.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor "	1	2	"	1	3	" " "
Pure "	1	6	"	1	7	" " "

Contracts Advertised To-Day.

The Milford Haven Gas and Water Committee invite tenders for the supply of gas coal. [Advert. on p. 500.]

Trade Notes.

New Spray-Painting Plant.

The Aerograph Company, Ltd., of Lower Sydenham, London, S.E. 26, have brought out a new type A.D. portable air-compressing outfit of sufficient capacity to operate a full-size standard spray gun, at a price which places it within the reach of the smaller re-finishing shop.

Gas Drying and Benzole Recovery.

A contract has been placed by the Stretford Gas Board (Col. W. M. Carr, Engineer) with Messrs. W. C. Holmes & Co., Ltd., for a patent "Dri-Gas" plant combined with a complete installation for the extraction of naphthalene and benzole. The necessary apparatus for the production of motor benzole is included. The plant will be capable of dealing with 4 million c.ft. of gas per day. Messrs. Holmes have also at present under construction benzole washing and distillation plants for the Gas Light and Coke Company (Fulham Station), the Devonport Works of the Plymouth Corporation, and Manchester Corporation (Rochdale Road Gas-Works).

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 20. (Provincial Exchanges Feb. 19.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Oct. 5	7⅛	7⅛	Alliance & Dublin Ord. ...	103—108	...	106
374,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	65—70	...	...
522,655	,,	Aug. 24	7	7	Barnet Ord. 7 p.c.	120—125	...	...
300,000	1	Oct. 19	1/9⅜	1/4⅜	Bombay, Ltd.	15/—17/6	...	16/3—16/6
177,750	10	Aug. 10	9	9	Bournemouth 5 p.c. ...	14⅜—15⅜	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12—13	...	...
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	10½—11½	...	...
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	53—58	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	73—78	...	...
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	92—97	...	...
357,900	,,	Aug. 24	7½	7½	Brighton & Hove 6 p.c. Con.	114—119	...	...
371,880	,,	,,	6¾	6¾	Do. 5 p.c. Con.	104—107	...	...
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max.	90—92[a]	...	...
120,420	,,	Jan. 4	4	4	Do. 1st 4 p.c. Deb. ...	77—79[a]	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	77—79[a]	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	97—98[a]	...	...
855,000	,,	Oct. 5	8	7	British Ord.	108—113	...	110—111
100,000	,,	Jan. 4	7	7	Do. 7 p.c. Pref.	110—115	+2	112—113½
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	70—75	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	90—95	...	...
160,000	,,	Jan. 4	5	5	Cambridge 5 p.c. Deb. ...	90—95	...	...
100,000	10	Nov. 30	8	6	Cape Town, Ltd.	8½—9½	...	...
100,000	10	Oct. 30	4½	4½	Do. 4½ p.c. Pref. ...	6½—7½	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	65—70	...	...
626,860	,,	Feb. 15	6	6	Cardiff Con. Ord.	93—96[a]	−2	...
237,860	,,	Jan. 4	2⅝	5	Do. 5 p.c. Red. Deb.	91—96	...	...
167,150	,,	Feb. 15	5	6½	Chester 5 p.c. Ord.	84½—89½[b]	−2½	...
98,936	1	Oct. 5	1/2/-	2/-	Colombo, Ltd. Ord....	27/—32/-	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	17/—19/-	...	...
609,204	1	Oct. 19	1/3·27	-/10·90	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/5·67	1/2·54	Do. 8 p.c. Pref.	10/—15/-	...	...
2,073,280	Stk.	Feb. 15	6	5⅝	Commercial Ord.	92½—95½[c]	−½	92½—95
475,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	51—56	...	54—55½
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	105—108[a]	−2	106½—111
469,590	,,	,,	5	5	Do. max. div.	80—83[a]	−2	...
542,270	,,	Aug. 24	10	7	Derby Con.	120—125[c]	...	...
55,000	,,	Jan. 4	4	4	Do. Deb.	65—70[c]	...	...
209,000	,,	Sept. 7	5	5	East Hull Ord. 5 p.c. ...	71—76	...	75½—76
179 500	,,	Aug. 24	5½	5½	East Surrey Ord. 5 p.c. ...	86—91	...	...
155,019	,,	Jan. 4	5	5	Do. 5 p.c. Deb. ...	90—95	...	...
1,002,180	,,	Sept. 21	16½	14	European, Ltd.	100—110	−3	102—105
18,911,138	,,	Feb. 15	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	18/6—19/6[d]	−/3	19/—19/6
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	55—60[a]	+1	56—59
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	71—76[a]	−2	74—76
6,102,497	,,	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	56—61	...	58½—60
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	95—100	+1	98½—100
2,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	85—90	...	88⅛—88⅞
162,280	,,	Sept. 7	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	...
82,500	,,	Aug. 24	7	7	Hastings & St. L. 5 p.c. Conv.	95—100	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	81—86	...	...
70,000	10	9 Oct. '30	‡	10	Hongkong & China, Ltd. ...	11—12	...	...
213,200	Stk.	Aug. 10	6	6	Hornsey Con. 3½ p.c. ...	89—92	...	...
2,800,000	,,	Oct. 30	25	15	Imperial Continental Cap.	340—360	+20	330—350
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb.	68—73[a]	...	69
235,242	,,	Aug. 10	8½	8½	Lea Bridge 8 p.c. Ord. ...	129—132	...	...
2,145,907	,,	Aug. 24	6	6	Liverpool 5 p.c. Ord. ...	97½—98⅛[b]	...	...
245,500	,,	—	—	5	Do. 5 p.c. Red. Pref. ...	94—99[b]	...	...
306,083	,,	Jan. 15	4	4	Do. 4 p.c. Deb. ...	78—80[b]	...	...
165,736	,,	Feb. 15	8	10	Maidstone 5 p.c. Cap. ...	119—124[a]	−4	...
56,176	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	51—56	...	...
75,000	5	Nov. 30	‡10	‡10	Malta & Mediterranean ...	6½—7	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	78—83	...	...
171,978	Stk.	Aug. 24	5	5	M. S. D. Utility "C." Cons.	76—81	...	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	67—72	...	...
112,126	,,	g	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
148,955	,,	g	5	5	Do. 5 p.c. Deb. ...	90—95	...	...
675,000	,,	May 21	‡6	‡6	Montevideo, Ltd.	70—80	...	...
2,061,315	,,	Aug. 10	5⅔	5	Newcastle & Gateshead Con.	16/6—17/3[d]	−/1½	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	68—70[d]	+1	...
691,705	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	68—70[d]	...	...
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Red. Deb.	96—98[d]	...	...
199,940	,,	Aug. 24	7½	7½	North Middlesex 6 p.c. Con.	105—110	...	...
396,160	,,	Feb. 15	5	5	Northampton 5 p.c. max. ...	72—77[a]	−2	...
300,000	,,	Nov. 30	7	9	Oriental, Ltd.	88—98	...	...
60,000	5	13 May, '15	—	—	Ottoman	0—½	...	...
205,162	Stk.	Jan. 4	8	8	Plym'th & Stonehouse 5 p.c.	114—119	...	...
504,416	,,	Feb. 15	8	8	Portsm'th Con. Stk. 4 p.c. Std.	116—121	−3	121—122
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	74—77[a]	−2	77
686,812	,,	Jan. 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	75—85	...	...
389,813	,,	Jan. 4	4	4	Do. 4 p.c. Cons. Deb.	75—85	...	...
150,000	10	Sept. 21	6	6	San Paulo 6 p.c. Pref. ...	7¼—7¾	...	...
1,736,968	Stk.	Sept. 7	6½	6	Sheffield Cons.	103—105[e]	...	...
95,000	,,	Jan. 18	4	4	Do. 4 p.c. Deb.	79—81[e]	...	...
133,201	,,	Sept. 7	5	8½	Shrewsbury 5 p.c. Ord. ...	90—95	...	...
90,000	10	June 11	15	15	South African	3—5	−½	...
6,709,895	Stk.	Feb. 15	5	7	South Met. Ord.	97—100[a]	...	96—99½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	104—109[a]	+1	105
1,895,445	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	55—60	...	...
1,000,000	,,	Jan. 18	4	5	Do. 5 p.c. Red. Deb.	95—100	+2	97—99
91,500	,,	Aug. 10	8½	8½	South Shields Con.	120—125[d]	...	...
1,543,795	,,	Feb. 15	6½	6	South Suburban Ord. 5 p.c.	98—103[a]	−2	103½—104½
668,887	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	91—96	...	...
647,740	,,	Aug. 24	5	5	Southampt'n Ord. 5 p.c. max.	77—80	...	...
121,275	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	70—75	...	...
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb.	98—101	...	...
1,076,490	,,	Aug. 10	6⅔	6⅔	Tottenham and District Ord.	103—107	...	104—104½
300,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	93—98	...	...
199,005	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	71—76	...	...
85,701	,,	Sept. 21	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	72—77	...	...
346,069	,,	Aug. 24	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	85—90	...	...
1,322,220	,,	July 9	7	7	Wandsworth and District: Consolidated	112—116	+2	114—114½
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	90—95	...	94
1,167,964	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	93—98	+1	96

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* The interest due 1/1/32 was paid on that date. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. =10 p.ct. p.a. less tax and less tax on interim dividend.

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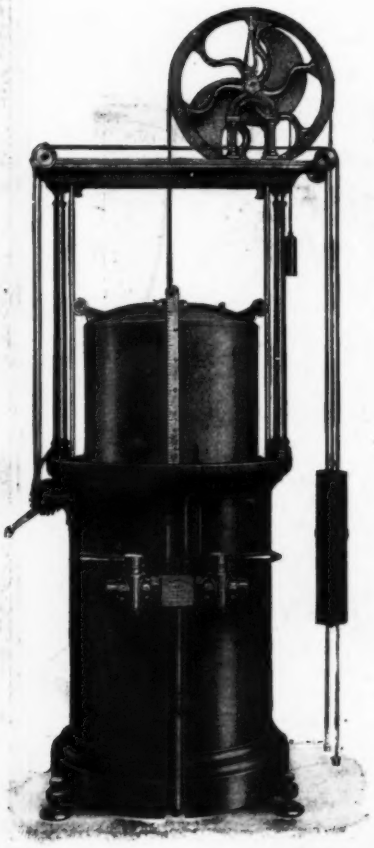

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